2013 – 39th Avenue NE Calgary, Alberta, T2E 6R7

BELL 212, 412, 205A-1, 205B

ROTORCRAFT FLIGHT MANUAL SUPPLEMENT

for the

INSTALLATION of RAPPEL MOUNT PROVISION

Limited Supplemental Type Certificate No. C-LSH08-157/D

Sections 1, 2, 3 and 4 of this document comprise the Transport Canada Approved sections of this Flight Manual Supplement. Compliance with Section 1, Limitations, is mandatory.

Section 5 and any subsequent sections if present are Unapproved and are provided for information only.

The information and data contained in this Flight Manual Supplement supersede or supplement that contained in the basic Approved Flight Manual for the 212 and 205A-1 when fitted with the Rappel Mount Provision. For limitations, procedures and performance not listed in this Flight Manual Supplement, refer to the Approved Flight Manual and other approved Flight Manual Supplements.

Transport Transports
Canada Canada

AIRCRAFT CERTIFICATION
DIVISION

APPROVED

By Ludoul

Approved Date 2008-05-07
YY-MM-DD

Revision 1 07 April 2008 Page 1 of 9
TRANSPORT CANADA APPROVED

AERO DESIGN LTD.

FMS758.90

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1 LIMITATIONS

1-3 TYPES OF OPERATIONS:

The Rappel Mount Provision is an approved provision for rappel operations only.

Rappel operations permitted during VFR conditions only.

1-4 FLIGHT CREW:

Rappel Operations:

A second crewman is required as a Rappel Operations Load Master if rappel operations are to be conducted. The crewman must have full access of the cabin to perform duties as a Rappel Operations Load Master.

Rappellers may be present as passengers essential to the operation. The Rappellers must have full access of the passenger area within the cabin to perform duties as a Rappel Crew Member.

All Rappel Crew Members are to be directed by the Rappel Operations Load Master.

The Rappel Operations Load Master and all Rappel Crew Members must wear a protective helmet for moving about in the aircraft.

Carriage of Passengers during non-rappel flights:

All passengers must remain seated with the seatbelt fastened during flight.

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TRANSPORT CANADA APPROVED

1-5 CONFIGURATION:

The aircraft may be equipped with:

A Left Hand Rappel Mount Provision,

A Right Hand Rappel Mount Provision, or

Both Left Hand and Right Hand Rappel Mount Provisions.

1-5-A REQUIRED EQUIPMENT FOR RAPPEL OPERATIONS:

The aircraft must have a functioning communications system betweent the pilot and the load master.

A hook knife must be:

- Carried by the Rappel Operations Load Master for immediate access, or
- Fixed within the helicopter interior, readily accessible to the Rappel Operations Load Master, as detail by the operating agency's operating procedures.

1-7 AIRSPEED

Rappel Operations: Hover with lateral translation at a speed not to exceed 10 knots is permitted for positioning only.

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1-20 MARKINGS AND PLACARDS

Placards 75801-11 and 75801-12 to be in clear view of the pilot

AIRCRAFT MUST BE IN HOVER FOR RAPPEL OPERATIONS

Placard 75801-11

RAPPEL OPERATIONS DURING VFR CONDITIONS ONLY

Placard 75801-12

Placard 75801-13 to be attached to Rappel Mount Provision in clear view of the load master.

MAXIMUM RAPPEL MOUNT CAPACITY 350 LBS (158 KG)

Placard 75801-13

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2 NORMAL PROCEDURES

2-1 INTRODUCTION:

The Rappel Mount Provision is approved for rappel operations only. A rappel operation is the continuous controlled decent of a single person (the rappeller) from the aircraft to the ground. The rappeller descends on a rope fixed to the Rappel Mount Provision and controls the decent.

This section contains instructions for conducting rappel operations.



INTENTIONALLY STOPPING THE DECENT PRIOR TO REACHING THE GROUND IS NOT PERMITTED



USING THE RAPPEL MOUNT PROVISION FOR EXTRACTIONS IS NOT PERMITTED.

2-3 PREFLIGHT CHECK:

Visually inspect the Rappel Mount Provision for loose fasteners and wear.

Ensure the roof and floor fittings are properly in position and locked.

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2-9 IN FLIGHT OPERATIONS - RAPPEL OPERATIONS:

Ensure communication between the pilot and the load master is established and maintained.



STOP RAPPEL OPERATIONS IF COMMUNICATION BETWEEN THE PILOT AND THE LOAD MASTER HAS FAILED

Rappel operations may commence only on the pilot's command

Rappel operations must stop on the pilot's command.

The aircraft must be in hover flight during rappel operations

The aircraft must maintain an altitude that ensures the rappel line is in contact with the ground.

The rappel rope must be dropped to the ground when the rappel operation is complete. Do not retract the rappel line into the aircraft.

The load master must observe the rappel operation and communicate to the pilot the status of the rappel operation continuously.

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3 EMERGENCY PROCEDURES

Suspension line jettisonability lies within the direct control of the load master under the pilots command. Clear communication between the pilot and the load master must be maintained during rappel operations.

SUSPENSION LINE JETTISON PROCEDURE

On the command of the pilot the load master must jettison the suspension line by:

- i. Releasing the suspension line, or
- ii. Cutting the line with the hook knife provided for the Rappel Operations Load Master.



THE SUSPENSION LINE MUST BE CUT AS SHORT AS PRACTICAL.

ANY LOOSE LINE REMAINING MUST BE IMMEDIATELY SECURED TO PREVENT ANY POSSIBLE ENTANGLEMENT WITH THE HELICOPTER ROTOR SYSTEM.

4 PERFORMANCE

No change from basic Rotorcraft Flight Manual.

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5 WEIGHT AND BALANCE

English Units		Longitudinal		Lateral	
Item	Weight	Arm	Moment	Arm	Moment
item	(Lb)	(in)	(in*Lb)	(in)	(in*Lb)
Left Hand Rappel Mount Provision (If Installed)	7.63	120.4	918.6	-39.5	-301.4
Right Hand Rappel Mount Provision	7.63	120.4	918.6	39.5	301.4
(If Installed)					

Metric Units		Longitudinal		Lateral	
Item	Weight	Arm	Moment	Arm	Moment
	(kg)	(m)	(kg*m)	(m)	(kg*m)
Left Hand Rappel Mount Provision (If Installed)	3.5	3.06	10.71	-1.00	-3.5
Right Hand Rappel Mount Provision	3.5	3.06	10.71	1.00	3.5
(If Installed)					

Note:

A rappeller suspended from the Rappel Mount Provision is located at Fuselage Station 113in and Right Butt Line 50in (for Right Hand Rappel Mount Provision) and/or Left Butt Line -50in (for Left Hand Rappel Mount Provision).

Revision 1 07 April 2008 Page 9 of 9 UNAPPROVED SECTION



Department of Transport

Limited Supplemental Type Certificate

This approval is issued to:

Number: C-LSH08-157/D

AERO Design Ltd.

Issue No.:

2013 39th Avenue NE

Approval Date: 14 May 2008

Calgary, Alberta

Issue Date: 14 May 2008

Canada T2E 6R7

Responsible Office:

Prairie and Northern

Aircraft/Engine Type or Model:

BELL 212

Registration/Serial No.:

C-GALI/30525, C-FAHZ/30562, C-FAHL/30588, C-GIRZ/30622, C-GAHV/30699, C-FAHR/30789, C-FAHB/30794, C-FALV/30816, C-FAHK/30852, C-FAHP/30933, C-GAHO/30937, C-FAHG/30940,

C-FALK/30982, C-GRNR/30999, C-FAHC/31246

Canadian Type Certificate or Equivalent:

Description of Type Design Change:

Rappel Mount Provision and Cargo Deployment Arm

Installation/Operating Data,

Required Equipment and Limitations :

Configuration A - Rappel Mount Provision Installation Only:

Installation of the Rappel Mount Provision to be completed in accordance with Transport Canada approved, AERO Design Ltd. Document Control List, DCL758-1, Revision 0, dated 07 May 2008, or later approved revision.

Transport Canada approved, AERO Design Ltd. Flight Manual Supplement FMS758.90, Revision 1, dated 07 May, 2008, or later approved revision is required with this installation.

Configuration B - Rappel Mount Provision Installation with Cargo Deployment Arm Installation: Installation of the Rappel Mount Provision and Cargo Deployment Arm to be completed in accordance with Transport Canada approved, AERO Design Ltd. Document Control List, DCL758-1, Revision 0, dated 07 May 2008, and Transport Canada approved, AERO Design Ltd. Document Control List, DCL792-1, Revision 0, dated 07 May 2008, or later approved revisions.



Conditions: This approval is only applicable to the type/model of aeronautical product specified therein. Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated will not adversely affect the airworthiness of the modified product.

> E. Burgoin, DAR 290M For Minister of Transport



TRANSFER REQUEST

INSTRUCTIONS

A transfer of ownership requires a prior approval from the Minister.

The reissue of the certificate in the name of the transferee will be contingent upon a demonstration made by the new owner that he can fulfill the responsibilities of an approval holder. Refer to AMA 513/5 for further details.

REQUEST FOR TRANSFER OF OWNERSHIP – LIMI	TED SUPPLEMENTAL TYPE CERTI	FICATE or REPAIR DESIGN CERTIFICATE
FROM (NAME AND ADDRESS OF HOLDER)		
	<u> </u>	
TO (NAME AND ADDRESS OF TRANSFERE)		
TO (NAME AND ADDRESS OF TRANSFEREE)		
TRANSFER PARTICULARS (LICENSE AGREEMENT SALE OF RIGHTS, ETC.)	1	
DATE TRANSFER REQUIRED:		, ao Man,
		1 1 1 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2
	SIGNATURE	
	(OF ORIGINAL OWNER)	30 AUANA 20

(Continuation Sheet)

Number: C-LSH08-157/D Issue 1

NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE CERTIFICATE REFERRED TO THEREIN.

Transport Canada approved, AERO Design Ltd. Flight Manual Supplement FMS758.90, Revision 1, dated 07 May, 2008, and Transport Canada approved, AERO Design Ltd. Flight Manual Supplement FMS792.90, Revision 1, dated 07 May, 2008, or later approved revision is required with this installation

Configuration A and B

Optional Equipment - Rappel Step Installation:

Installation of the Rappel Step to be completed in accordance with Transport Canada approved, AERO Design Ltd. Document Control List, DCL798-1, Revision 0, dated 14 May 2008.

The Rappel Step is optional and is not required with installation of Configuration A and B.

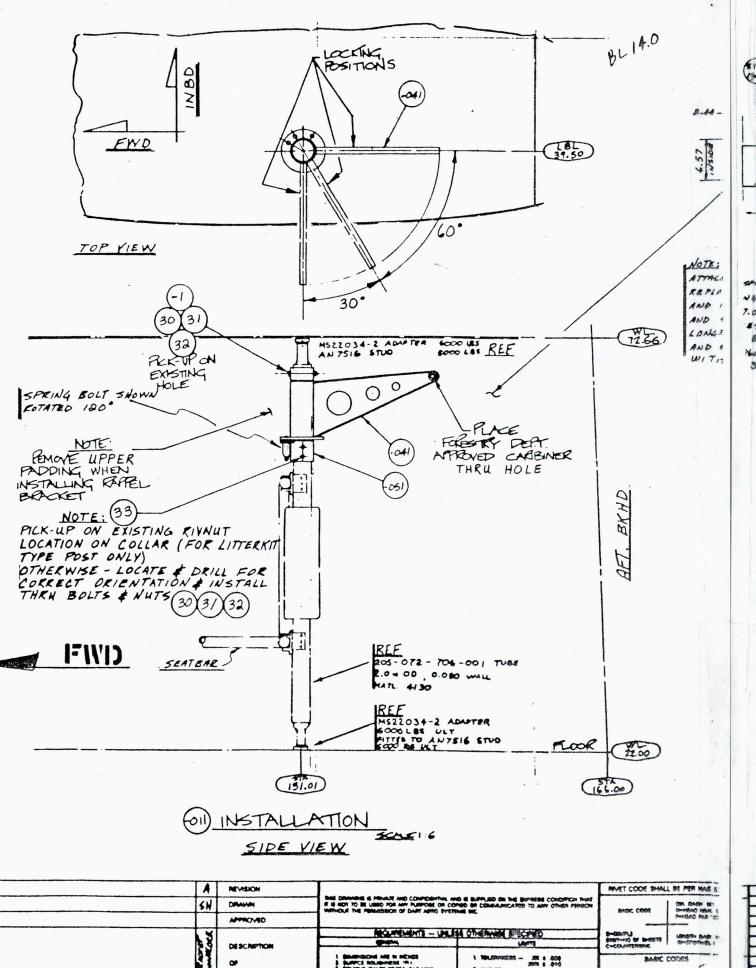
Rappel Step installed in accordance with DCL798-1 may remain installed if Configuration A and B are removed.

Data Pertinent to All Configurations:

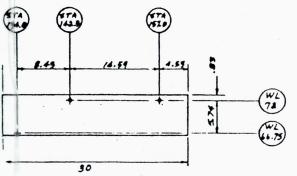
Transport Canada accepted, AERO Design Ltd. Instructions for Continued Airworthiness ICA758.90, Revision 0, dated 07 May, 2008, or later accepted revision is required with this installation.

Basis of Certification for installation is FAR 29 at amendment 29-2 and amendment 29-43 for 29.865(a) and 29.865(e).

End -



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NOTES

- 51 ALL MATERIAL, PARTS & COMPONENTS MUST MEET REQUIREMENTS OF EXT MANUAL PART 1, PARAGRAPH 3.1.3.
- 52 WORKMANGHIP MUST BE TO REQUIREMENTS OF EGT MANUAL; AC43.13.14 FZA.
- 53. WELD IN ACCORDANCE WITH MIL-W-8604
- 5 4. REMOVE RUST & SCALE, PRIME AND PAINT TO MATCH EXISTING POST.

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Aircraft Mfgr: Aircraft Model: Registration:	Bell 212, 412, 205, 205B C-GALI, C-FA C-FAHL, C-FA C-GIRZ, C-FA C-GAHV, C-F, C-GAHO, C-F C-FALK, C-GI C-FAHC	.HR, AHB, ALV, AHK, AHP, AHG,	Model Type Airplane Helicopter Appliance Component	Revision Date: Approval No.: C-LSH			
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Document	Number		Docum	nent Title		Compliance	
DCL758-1 75801	Revision 0 Revision 0		t Control List lount Provision Installation	ent rue		Status As per Compliance CP758-1 Rev 0	
DCL758-2 75820 75824 75825 75826 75830 75831 75832 75833 75834 75835 75836 ER758.01	Revision 0	Rappel M Assembly Assembly Assembly Tube Retainer Guide Stanchion Curved W Gate Parl Bearing C	Vasher ts				
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	E. Burgoin, DAR 290M						

DOCUMENT NO.	DOCUME	NT CONTENT	REVISION
INSTALLATION DOCUMENTS			
75801	Rappel Mount Provision	0	
ICA758.90	Instructions for Continue	d Airworthiness	0
FMS758.90	Flight Manual Supplemen	nt	1
FABRICATION DOCUMENTS			-
DCL758-2	Document Control List – Assembly	0	
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ENGINEERING DOCUMENTS			
APPROVAL: Transport Canada E. BURGOIN DAR 290M	ORIGINAL DATE: 07 May 2008 REVISION DATE:	AERO DESIG 2013 – 39 th Ave NE, Calgary, A Ph. (403) 250-802 Fax. (403) 250-83	lberta, T2E 6R7 27
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75820	Rappel Mount Asser	nbly	0
75824 75825 75826	Assembly, Plug, STI Assembly, Plug, Gui Assembly, Plug, 131	de	0 0 0
75830 75831 75832 75833 75834 75835 75836	Tube Retainer Guide Stanchion Adapter Curved Washer Gate Parts Bearing Clip		0 0 0 0 0 0
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Transport Canada E. BURGOIN DAR 299M	ORIGINAL DATE: 07 May 2008 REVISION DATE:	AERO DESIGI 2013 – 39 th Ave NE, Calgary, Al Ph. (403) 250-802 Fax. (403) 250-833	berta, T2E 6R7 ?7
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Aircraft Mfgr: Aircraft Model: Registration:	Bell 212, 412, 205 205B C-GALI, C-FA		Model Typ	П	Revision: Revision Date: Approval No.:		ay 2008 H08-157/D	
	C-FAHZ, C-FA C-FAHL, C-FA C-GIRZ, C-FA C-GAHV, C-F C-GAHO, C-F C-FALK, C-GI C-FAHC	AHB, Helicopter ALV, Appliance Component AHP, FAHG,		Delegation No.: Delegate Name: Classification of Designee: Employer:	290M E. Burgoin AERO Design Ltd.			
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INSTALLATION DOCUMENTS				
75801	Rappel Mount Provi	sion Installation	0	
ICA758.90	Instructions for Cont	inued Airworthiness	0	
FMS758.90	Flight Manual Suppl	ement	1	
FABRICATION DOCUMENTS				
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75820	Rappel Mount Asser	mbly	0
75824 75825 75826	Assembly, Plug, ST Assembly, Plug, Gu Assembly, Plug, 13	ide	1 1 1
75830 75831 75832 75833 75834 75835 75836	Tube Retainer Guide Stanchion Adapter Curved Washer Gate Parts Bearing Clip		0 0 0 0 0
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DEPARTMENT OF TRANSP STATEMENT OF COMPLIANCE OF AIRCRA COMPONENTS WITH THE AIRWORTHINES			RAFT OR AIRCRAFT	AE-100 No.: Initial Issue Date:	AE75 07 Ma	8-2 ay, 2008
Aircraft Mfgr: Aircraft Model: Registration:	Bell 212, 412, 205 205B C-GALI, C-FA C-FAHZ, C-FA C-GRZ, C-FA C-GAHV, C-F C-GAHO, C-F	AHR, AHB, ALV, AHK, AHP,	Model Type Airplane Helicopter Appliance Component	Revision: Revision Date: Approval No.: Delegation No.: Delegate Name: Classification of Designee: Employer:	C-LSI 290M E. Bu	
	C-FALK, C-G C-FAHC					
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Document	Number		Docur	ment Title		Compliance Status
DCL758-1 75801	Revision 2 Revision 0		t Control List lount Provision Installation			As per Compliance CP758-1 Rev 0
DCL758-2 75820 75824 75825 75826 75830 75831 75832 75833 75834 75835 75836 ER758.01	Revision 1 Revision 0 Revision 1 Revision 1 Revision 0	Rappel M Assembly Assembly Assembly Tube Retainer Guide Stanchion Curved W Gate Part Bearing C	/asher			
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75801	Rappel Mount Provi	sion Installation	0
ICA758.90	Instructions for Con	tinued Airworthiness	1
FMS758.90	Flight Manual Suppl	ement	1
FABRICATION DOCUMENTS			
DCL758-2	Document Control L Assembly	1	
ENGINEERING DOCUMENTS			
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E. BURGOIN DAR 290M A PA ROVED	ORIGINAL DATE: 07 May 2008 REVISION DATE: 16 June 2008	AERO DESIGN 2013 – 39 th Ave NE, Calgary, Alb Ph. (403) 250-802; Fax. (403) 250-833	perta, T2E 6R7 7
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DEPARTMENT OF TRANSPORT STATEMENT OF COMPLIANCE OF AIRCRAFT OR AIRCRAFT COMPONENTS WITH THE AIRWORTHINESS REQUIREMENTS					AE-100 No.: Initial Issue Date:		8-3 ay, 2008	
Aircraft Mfgr: Aircraft Model:	212 /12 2054-1		Model Type		Revision: Revision Date: Approval No.:	0 C-LSI	H08-157/D	
Registration:	C-GALI, C-FA C-FAHZ, C-FA C-FAHL, C-FA C-GIRZ, C-FA C-GAHV, C-F C-GAHO, C-F C-FALK, C-GI C-FAHC	AHB, ALV, AHK, AHP, AHG,	Airplane Helicopter Appliance Component		Delegation No.: Delegate Name: Classification of Designee: Employer:	E. Bu	290M E. Burgoin AERO Design Ltd.	
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INSTALLATION DOCUMENTS	, ,		
79201	Cargo Deployment A	0	
ICA758.90 FMS792.90	Instructions for Cont Flight Manual Supple		0 1
FABRICATION DOCUMENTS			
DCL792-2	Document Control L	ist Cargo Arm Assembly	0
ENGINEERING DOCUMENTS			
APPROVAL: Transport Canada E. BURGOIN DAR 290IM APPROVED By ROVED Appr'l No. CASHOB-ISTA Appr'l Date 14 MAY 1008	ORIGINAL DATE: 07 May 2008 REVISION DATE:	AERO DESIGN LTD. 2013 – 39 th Ave NE, Calgary, Alberta, T2E 6 Ph. (403) 250-8027 Fax. (403) 250-8333	
	SHEET 1 OF 1	Bell 212, 412, 205A-1, 205B Cargo Deployment Arm Installation	
Issue Date 14 MAY 2008	DC	L792-1	Rev.

DOCUMENT NO.	DOCU	MENT CONTENT	REVISION
INSTALLATION DOCUMENTS			
FABRICATION DOCUMENTS			
79220	Cargo Deployment A	Arm Assembly	0
79230 79231 79232 79233 79234 79235 79236 79237	Cargo Arm Bearing Sleeve Cover Bushing Sleeve Lock Leaver Bushing Bushings		0 0 0 0 0 0
ENGINEERING DOCUMENTS			
ER758.01	Engineering Report		0
Transport Canada E. BURGOIN DAR 290M	ORIGINAL DATE: 07 May 2008 REVISION DATE:	AERO DESIGI 2013 – 39 th Ave NE, Calgary, Al Ph. (403) 250-802 Fax. (403) 250-833	berta, T2E 6R7 ?7
Appril Date 14 Sign 2008	SHEET 1 OF 1	Bell 212, 412, 205A Cargo Deployme Assembly	nt Arm
Issue Date 19 MAY UDS	DC	L792-2	Rev.

DCL792-1 Revision 1 79201 Revision 1 79201 Revision 1 79201 Revision 1 79220 Revision 1 79220 Revision 1 79220 Revision 1 79230 Revision 0 79231 Revision 0 79232 Revision 0 79233 Revision 0 79233 Revision 0 79234 Revision 0 79235 Revision 0 79236 Revision 0 79237 Revision 0 79237 Revision 0 Revision 0 79237 Revision 0							_	
Aircraft Mfgr: 8ell 212, 412, 205A-1, 205B-1, 205B Registration: 205B C-LSH08-157/D 205B Registration: C-FAHZ,	STATEMENT OF COMPLIANCE OF AIRCRAFT OR AIRCRAFT							
Aircraft Model: 212, 412, 205A-1, 205B Registration: C-GALI, C-FAHR, C-FAHZ, C-FAHZ, C-FAHZ, C-FAHZ, C-FAHZ, C-FAHZ, C-FAHZ, C-GAHZ, C-GAHZ	Aires G AAC	D. II						ay 2008
Registration: C-FALIC, C-FAHB, C-GAHV, C-FAHB, C-GAHV, C-FAHB, C-GAHV, C-FAHB, C-GAHV, C-FAHB, C-FALK, C-GRNR, C-FAHG C-FAHC		212, 412, 205	A-1,	Model Type	9	Approval No.:	C-LSI	H08-157/D
C-GAHV, C-FAHP, C-GAHO, C-FAHB, C-FAHB	Registration:	C-GALI, C-FA				Delegation No.:	290M	
C-GAHV, C-FAHP, C-GAHO, C-FAHB, C-FAHB		C-FAHL, C-FA	ALV,	Appliance		Delegate Name:		
Document Number Document Title Compliance Status		C-GAHV, C-F. C-GAHO, C-F C-FALK, C-GI	AHP, AHG,				AERO	Design Ltd.
Document Number Document Provision 1 Typ201 Revision 1 Typ201 Revision 1 Typ201 Revision 1 Typ201 Revision 1 Typ200 Revision 0 Typ231 Revision 0 Typ231 Revision 0 Typ232 Revision 0 Typ232 Revision 0 Typ233 Revision 0 Typ233 Revision 0 Typ234 Revision 0 Typ235 Revision 0 Typ236 Revision 0 Typ237 Revision 0 Typ238 Revision 0 Typ239 Revision 0 Typ239 Revision 0 Typ239 Revision 0 Typ230 Revision 0 Typ230 Revision 0 Typ231 Revision 0 Typ231 Revision 0 Typ231 Revision 0 Typ232 Revision 0 Typ233 Revision 0 Typ234 Revision 0 Typ235 Revision 0 Typ236 Revision 0 Typ237 Revision 0 Typ237 Revision 0 Typ238 Revision 0 Typ239 Revision 0 Typ239 Revision 0 Typ239 Revision 0 Typ230 Rev		C-PARC	LI	ST OF APPROVED	REPO	RTS AND DATA		
DCL792-1 Revision 1 Revision 1 Document Control List Cargo Deployment Arm Installation CP758-2 Rev Compliance CP75	Document	Number			Docum	ent Title		Compliance
79220 Revision 1 79231 Revision 0 79231 Revision 0 79232 Revision 0 79233 Revision 0 79234 Revision 0 79234 Revision 0 79235 Revision 0 79236 Revision 0 79237 Revision 0 79237 Revision 0 79238 Revision 0 79239 Revision 0 79239 Revision 0 79230 Revision 0 79231 Revision 0 79231 Revision 0 79232 Revision 0 79233 Revision 0 79235 Revision 0 79236 Revision 0 80120 Revision 0 80120 Revision 0 80120 Revision 0					allation			
UNDER THE AUTHORITY VESTED IN ME BY THE DEPARTMENT OF TRANSPORT, I HEREBY CERTIFY THAT THE DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED NII HAVE BEEN EXAMINED IN ACCORDANC WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY, TO THE BEST OF MY KNOWLEDGE AND BELIEF WIT THE PERTINENT COMPLIANCE REQUIRMENTS.	79220 79230 79231 79232 79233 79234 79235 79236 79237 ER758.01	Revision 1 Revision 0	Cargo De Cargo Arr Bearing S Cover Bushing Sleeve Lock Lear Bushing Bushings Engineeri	ployment Arm Assem Sleeve ver ing Report it Control List ing Report		TRANSPORT CANADA		CF730-2 Rev I
UNDER THE AUTHORITY VESTED IN ME BY THE DEPARTMENT OF TRANSPORT, I HEREBY CERTIFY THAT THE DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED NII HAVE BEEN EXAMINED IN ACCORDANC WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY, TO THE BEST OF MY KNOWLEDGE AND BELIEF WIT THE PERTINENT COMPLIANCE REQUIRMENTS.				CERTI	FICATIO	DN		
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I THEREFORE [□] RECOMMEND FOR APPROVAL OF THESE DATA	DATA LISTED A WITH ESTABLI	DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED NII HAVE BEEN EXAMINED IN ACCORDANCE WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY, TO THE BEST OF MY KNOWLEDGE AND BELIEF WITH						
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E Burgoin DAR 290M						And By		

DOCUMENT NO.	DOCU	MENT CONTENT	REVISION	
INSTALLATION DOCUMENTS				
79201	Cargo Deployment A	Cargo Deployment Arm Installation		
ICA758.90 FMS792.90	Instructions for Cont Flight Manual Suppl		0 1	
FABRICATION DOCUMENTS				
DCL792-2	Document Control L	ist Cargo Arm Assembly	1	
ENGINEERING DOCUMENTS				
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APPROVAL: Transport Canada E. BURGOIN	ORIGINAL DATE:	<i>AERO</i> DESIGN	N LTD.	
27K 580W	07 May 2008 REVISION DATE:	2013 – 39 th Ave NE, Calgary, Al Ph. (403) 250-802	berta, T2E 6R7 7	
BYDAPPROVED	27 May 2008	Fax. (403) 250-833		
Appri No. G-15408 -15710		Bell 212, 412, 205A		
7000	SHEET 1 OF 1	Cargo Deployme Installation		
I SOUR NO			Rev.	
REV 1 27 MAY 2008	DC	4		
27 MAY 2008	DC	L792-1		

DOCUMENT NO.	DOCU	MENT CONTENT	REVISION
INSTALLATION DOCUMENTS			
FABRICATION DOCUMENTS			
79220	Cargo Deployment A	Arm Assembly	1
79230 79231 79232 79233 79234 79235 79236 79237	Cargo Arm Bearing Sleeve Cover Bushing Sleeve Lock Leaver Bushing Bushings		0 0 0 0 0 0
DCL801 ENGINEERING DOCUMENTS	Document Control L	ist	0
ER758.01	Engineering Report		0
Transport Canada E. BURGOIN DAR 290M	ORIGINAL DATE: 07 May 2008 REVISION DATE: 27 May 2008	AERO DESIGN 2013 – 39 th Ave NE, Calgary, Al Ph. (403) 250-802 Fax. (403) 250-833	berta, T2E 6R7 7
Apprino G-LSHOB-157/15 Apprinate 14 MAI	SHEET 1 OF 1	-1, 205B nt Arm	
Appril Date 14 MAY 2008 Issue No. Issue Date 14 MAY 2008 REU ; 27 MAY 2008	DC	L792-2	1

DEPARTMENT OF TRANSPORT STATEMENT OF COMPLIANCE OF AIRCRAFT OR AIRC COMPONENTS WITH THE AIRWORTHINESS REQUIRE			RAFT OR AIRCRAFT		AE-100 No.: Initial Issue Date:	07 Ma	8-3 ay, 2008	
Aircraft Mfgr: Aircraft Model: Registration:	Bell 212, 412, 205 205B C-GALI, C-FA C-FAHZ, C-FA C-FAHL, C-FA	AHR, Airplane AHB, Helicopter ALV, Appliance		Revision: Revision Date: Approval No.: Delegation No.: Delegate Name: Classification of Designee:	16 Ju C-LS	2 16 June 2008 C-LSH08-157/D 290M E. Burgoin		
	C-GAHV, C-F C-GAHO, C-F C-FALK, C-G C-FAHC	RNR,			Employer:	AERC	Design Ltd.	
		LI	ST OF APPROVED R	EPOF	RTS AND DATA			
Document				ocum	ent Title		Compliance Status	
DCL792-1 79201	Revision 2 Revision 1		t Control List ployment Arm Installat	tion			As per Compliance CP758-2 Rev 1	
DCL792-2 79220 79230 79231 79232 79233 79234 79235 79236 79237	Revision 1 Revision 0		ileeve	bly				
ER758.01	Revision 0	Engineeri	ng Report					
DCL801 80120 ER758.01	Revision 0 Revision 0 Revision 0	Documen Bracket Engineeri	t Control List ng Report					
			DATA APPROVE	D BY	TRANSPORT CANADA			
	CERTIFICATION							
DATA LISTED A WITH ESTABLIS	UNDER THE AUTHORITY VESTED IN ME BY THE DEPARTMENT OF TRANSPORT, I HEREBY CERTIFY THAT THE DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED NII HAVE BEEN EXAMINED IN ACCORDANCE WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY, TO THE BEST OF MY KNOWLEDGE AND BELIEF WITH THE PERTINENT COMPLIANCE REQUIRMENTS.							
I THEREFORE	I THEREFORE [□] RECOMMEND FOR APPROVAL OF THESE DATA							
	[⊠] APPROVE THESE DATA E. Burgoin, DAR 2901							

DOCUMENT NO.	DOCU	MENT CONTENT	REVISION			
INSTALLATION DOCUMENTS						
79201	Cargo Deployment	Arm Installation	1			
ICA758.90 FMS792.90		Instructions for Continued Airworthiness Flight Manual Supplement				
FABRICATION DOCUMENTS						
DCL792-2	Document Control L	ist Cargo Arm Assembly	1			
ENGINEERING DOCUMENTS						
ENGINEER WAS BOOKINER TO						
APPROVAL:	ORIGINAL DATE:	<i>AERO</i> DESIGN	LLTD			
Transport Canada E. BURGOIN E. BURGOIN	07 May 2008	2013 – 39 th Ave NE, Calgary, Alb	perta, T2E 6R7			
DARE	REVISION DATE: 16 June	Ph. (403) 250-802 Fax. (403) 250-833				
MAP DROVED		Bell 212, 412, 205A	-1. 205B			
By (\$157)	SHEET 1 OF 1	Cargo Deploymer	nt Arm			
By - SNOB 1575 Appr'l No SNOB 1575 Appr'l Date 14 1149 2008 Issue Date 4 1149 2008	ā.	Installation				
Appril Date			Rev.			
Issue No4 MAY 2008	1 DC	L792-1	2			
SSIE CA						

	Bell 212, 412, 205 205B C-GALI, C-FA C-FAHZ, C-F, C-GIRZ, C-FA C-GAHV, C-F	AHR, Airplane			AE-100 No.: Initial Issue Date: Revision: Revision Date: Approval No.: Delegation No.: Delegate Name: Classification of Designee: Employer:	14 Ma 0 C-LSI 290M E. Bu	ay, 2008 H08-157/D
	C-GAHO, C-F C-FALK, C-G C-FAHC		l i				
		LI	ST OF APPROVE	D REPO	RTS AND DATA		H
Document	Number			Docum	ent Title		Compliance Status
DCL798-1 79801	Revision 0 Revision 0		t Control List tep Installation	>			As per Compliance CP798 Rev 0
DCL798-2 79820 79830 79831 79832 79833 79834 79835 78230	Revision 0	Rappel S Step Mounting Mounting Block Kick Plate Bushing Step Extr					
TP798.02	Revision 0	Test Plan	/Report (Flight)				
			DATA APPRO	OVED BY	TRANSPORT CANADA		
			CERT	IFICATIO	DN		
DATA LISTED A WITH ESTABLIS	UNDER THE AUTHORITY VESTED IN ME BY THE DEPARTMENT OF TRANSPORT, I HEREBY CERTIFY THAT THE DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED NII HAVE BEEN EXAMINED IN ACCORDANCE WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY, TO THE BEST OF MY KNOWLEDGE AND BELIEF WITH THE PERTINENT COMPLIANCE REQUIRMENTS.						
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DOCUMENT NO.	DOCU	MENT CONTENT	REVISION
INSTALLATION DOCUMENTS			
79801	Rappel Step Installa	ition	0
ICA758.90	Instructions for Conf	tinued Airworthiness	0
FABRICATION DOCUMENTS			
DCL798-2	Document Control L	ist Rappel Step Assembly	0
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ENGINEERING DOCUMENTS			
APPROVAL TRANSPORTED AND APPROVAL TO THE PROPERTY OF THE PROPE	ORIGINAL DATE:	4ED 0 = =====	
Transport Canada	14 May 2008	$AERO$ DESIGN 2013 – 39 $^{ m th}$ Ave NE, Calgary, Al	V LTD. berta, T2E 6R7
E. EURGONN DAR 200M	REVISION DATE:	Ph. (403) 250-802 Fax. (403) 250-833	7
By APPROVED.		Bell 212, 412, 205A	
Appril No. 6-65 HO8-1576	SHEET 1 OF 1 Rappel Step Installation		
Appel Date 14 17A 1 2008 15848 Date 14 17Ay 2008			Rev.
Issue Date 14 17 AV 1000	DC	L798-1	Λ
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DOCUMENT NO.	DOCU	MENT CONTENT	REVISION		
INSTALLATION DOCUMENTS					
FABRICATION DOCUMENTS					
79820	Rappel Step Assem	bly	0		
79830 79831 79832 79833 79834 79835 78230	Step Mounting Plate STN Mounting Plate STN Block Kick Plate Bushing Step Extrusion	1 84 1 129	0 0 0 0 0		
ENGINEERING DOCUMENTS					
ER758.01 TP798.02	Engineering Report Test Plan/Report		0		
APPROVAL: Transport Canada E. BURGOIN DAR 290M	ORIGINAL DATE: 14 May 2008 REVISION DATE:	AERO DESIGN LTD. 2013 – 39 th Ave NE, Calgary, Alberta, T2E 6R7 Ph. (403) 250-8027 Fax. (403) 250-8333			
Apprino C-LSHOB-157/	SHEET 1 OF 1	Bell 212, 412, 205A-1, 205B Rappel Step Assembly			
Appri Date 14 MAY 2008 ISSUE NO. IN THE LANGE THE STATE OF THE STATE O	DC	L798-2	O .		

DEPARTMENT OF TRAN STATEMENT OF COMPLIANCE OF AIRC COMPONENTS WITH THE AIRWORTHIN Aircraft Mfgr: Aircraft Model: Bell 212, 412, 205A-1, 205B Registration: C-GALI, C-FAHR, C-FAHZ, C-FAHB, C-FAHL, C-FALV, C-GIRZ, C-FAHK, C-GAHV, C-FAHF, C-GAHO, C-FAHG, C-FALK, C-GRNR, C-FALK, C-GRNR, C-FAHC		RAFT OR AIRCRAFT	AE-100 No.: Initial Issue Date: Revision: Revision Date: Approval No.: Delegation No.: Delegate Name: Classification of Designee: Employer:	AE758-4 14 May, 2008 1 16 June, 2008 C-LSH08-157/D 290M E. Burgoin AERO Design Ltd.		
		LI	ST OF APPROVED REPO	DRTS AND DATA		
Document	Number		Docur	ment Title		Compliance Status
DCL798-1 79801 DCL798-2 79820 79830 79831 79832 79833 79834 79835 78230	Revision 1 Revision 0	Documen Rappel Si Step Mounting		o de la companya de l		As per Compliance CP798 Rev 0
ER758.01 TP798.02	Revision 0 Revision 0		ng Report /Report (Flight)	/TDANODODT 044454		
			DATA APPROVED BY	Y TRANSPORT CANADA		
			CERTIFICATI	ON		
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DOCUMENT NO.	DOCU	REVISION			
INSTALLATION DOCUMENTS					
79801	Rappel Step Installa	0			
ICA758.90	Instructions for Conf	1			
FABRICATION DOCUMENTS					
DCL798-2	Document Control L	0			
ENGINEERING DOCUMENTS					
	No.				
APPROVAL.	ORIGINAL DATE:	1770			
Transport Canada E. BURGOIN	14 May 2008	AERO DESIGN 2013 – 39 th Ave NE, Calgary, Alb			
DAR 290M	REVISION DATE: 16 June 2008	Ph. (403) 250-802 Fax. (403) 250-833	103) 250-8027		
APPROVED.		Bell 212, 412, 205A			
Appril No. C-15 HOB-157/15 Appril Date 14 MAY 2008	SHEET 1 OF 1				
Appr'l Date /7 // 1/2008		R	ev.		
Issue Date 14 MAY 2008	DC	L798-1	1		
THE CLARGE SEAS CLARACTE SHARRANCE MANAGE SERVICE STREET, SHARRANCE STREET, SHARRANC	, 502,00				

	MODIFICATION APPROV	'AL R	EQUEST AP	PLICAT	TIÓN FO	ORM	MOD7	758, Rev. 0	
1.	NAME AND ADDRESS OF APPLICANT:	2.	IDENTIFICATION	OF PRODI	IGT				
	AERO Design Ltd. MAKE: 2013 - 39 th AVE NE				MC	ODEL:			
	Calgary, AB T2E 6R7	В	ell			205A-1, 2	05B, 212,	412	
_	ALL CORRESPONDANCE TO:	SEF	RIAL No.:		RE	GISTRATIO	N;		
	AERO Design Ltd. 2013 39th Ave N.E.		ee Attached - A			See Attached - Alpine			
	Calgary, AB T2E 8R7	H	elicoptera Ltd, 8	leet Info		Helicopter	9 Ltd. Fle	et Info	
3,	REQUEST FOR:								
	A. SUPPLEMENTAL TITE CERTIFICATE (STC)	<u>-</u>							
	P. STOISTA REVISION		STO/OTA NA.						
	C. LIMITÉD SUPPLEMENTAL TYPE CERTIFICATE (LSTC)	\boxtimes							
	D. LIMITED STOISTA REVISION		LSTC/LSTA No.						
	E. F.A.A. SUPPLEMENTAL TYPE CERTIFICATE								
	F. F.A.A. STC REVISION		STC No.						
	G. FAMILIARIZATION OF F.A.A. STC		STC No.						
		7	3101101						
	H. REPAIR DESIGN APPROVAL (RDC)								
	I. PARTS DESIGN APPROVAL (PDA)								
4.	TITLE OF MODIFICATION OR REPAIR: Installation of a rappel mount provision and cargo deployment pro-	ovialon.							
٤,	BRIEF DESCRIPTION OF MODIFICATION OR REPAIR:								
	The installation provides an aircraft mount for rappelling and card	o deploy	meni operations by	trained per	sonnel (ie.	rappelling fir	e fighters).		
8,	APPLICABLE TYPE APPROVAL (TA) OR TYPE CERTIFICATE	(TC) D	DCUMENTS;						
	A. TA NO. H-86 B. TC No. H15W		C. OTHER						
7.	PROPOSED BASIS OF APPROVAL:								
	A. SAME AS TA 🗵 B. SAME AS TO 🗀		C. OTHER [(Please :	specify)				
B.			REQUIRED		JIRED	FOR DOT USE ONLY			
DOCUMENTATION CHECKLIST							RECEIVED		
				YES	ND	YES	NO	DATE	
	COMPLIANCE PROGRAM			X					
_	MASTER DRAWING LIST			X		 			
	FLIGHT MANUAL SUPPLEMENT			X					
_	MAINTENANCE MANUAL SUPPLEMENT				Х			ļ	
	INSTRUCTIONS FOR CONTINUING AIRWORTHINESS			X		<u> </u>	-		
	ENGINEERING REPORTS			X				1	
-	DESIGN DRAWINGS				X	+			
	Manufacture drawings & installation instruction Electrical Load analysis	15		X	<u>,</u>			-	
	DRAFT STC, LSTC OR RDA				X	_	-		
	WEIGHT AND MOMENT CHANGE			X	^	 			
_	FLIGHT TEST DATA				×	+	-	-	
	OTHER (Specify)				X	 			
9,	APPLICANT'S REMARKS:								
	C-LSH08-157 /	D		\subset -	08-	-03	63		
10.	In addition to the payment of Afroratt Contification approval fees as prescrib incremental expenses as in Aviation Regulation Directive No. 3, or equival	ed in Car	adian Avistion Regula	tions (CAR) :	Section 104,	Lagrae to rein	burse Transp MA 513/4	ort Canada	
	AERO Design Ltd.	om, oo ap	pineario, 100 termior of	orento Boscott	ing cont inco	**************************************			
	PER:	Cor	sultant				08 April, 2	8008	
	SIGNATURE OF APPICANTS	TITLE					ÇATÇ		
11.						-	. en	-74	
	SIGNATURE OF REGIONAL ENGINEER					10	04 -04		
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+	Form/MOD, 26 Merch, 2001								

FORM AE-100

		E OF AIRC RWORTHIN 	RAFT OR AIRCR ESS REQUIREM Model Typ Airplane Helicopter	ENTS	AE-100 No.: Initial Issue Date: Revision: Revision Date: Approval No.: Delegation No.: Delegate Name:	14 Ma 0 C-LSH 290M	AE758-5 14 May, 2008 0 C-LSH08-157/D 290M E. Burgoin		
	C-FAHL, C-FA C-GIRZ, C-FA C-GAHV, C-F C-GAHO, C-F C-FALK, C-G C-FAHC	AHK, AHP, AHG,	Appliance Component	<u> </u>	Classification of Designee: Employer:		Design Ltd.		
		LI	ST OF APPROVE	D REPO	RTS AND DATA				
Document	Number			Docum	ent Title		Compliance Status		
DCL801 80120	Revision 0 Revision 0	Documen Bracket	As per Compliant CP798 Rev Document Control List Bracket						
ER801.01	Revision 0	Engineeri	ing Report						
			DATA APPRO	OVED BY	TRANSPORT CANADA				
			CERT	TIFICATIO)N				
CERTIFICATION UNDER THE AUTHORITY VESTED IN ME BY THE DEPARTMENT OF TRANSPORT, I HEREBY CERTIFY THAT THE DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED NII HAVE BEEN EXAMINED IN ACCORDANCE WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY, TO THE BEST OF MY KNOWLEDGE AND BELIEF WITH THE PERTINENT COMPLIANCE REQUIRMENTS.									
ITHEREFORE	[□] RI	ECOMMEN	D FOR APPROVA	AL OF TH	IESE DATA				
[⊠] APPROVE THESE DATA E. Burgoin, DAR 290M									

DOCUMENT NO.	DOCU	MENT CONTENT	REVISION
INSTALLATION DOCUMENTS			
FABRICATION DOCUMENTS			
80120	Bracket		0
ENGINEERING DOCUMENTS			
ER801.01	Engineering Report	- Bracket	0
APPROVAL: Transport Canada E. BURGOIN DAR 290M	ORIGINAL DATE: 14 May 2008 REVISION DATE:	AERO DESIGN 2013 – 39 th Ave NE, Calgary, AI Ph. (403) 250-802 Fax. (403) 250-833	berta, T2E 6R7 7
Apprino C-ASHOR-157/5	SHEET 1 OF 1	Bell 212, 412, 205A BRACKET	
Appril Date (4 May 2008) issue No. issue Date/4 May 2000	D	CL801	O

758

Regualtory Load Requirements (FAR 29 Amendment 2)

$$n_{man} := 3.5$$

Maneuvering load factor

$$n_{sf} = 1.5$$

Safety factor

$$n_{ff} = 1.15$$

Fitting factor

Allowable Ultimate Loads on Helicopter Attachment Fittings

Roof fitting allowable at FS 105.1, Ref: Bell Helicopter

$$P_{allow FS131.0} = 2150 \cdot lbf$$

Floor allowable at FS 131.0, Ref: Bell Helicopter

APPLIED LOADS

Assume rappler and gear weighs maximum of 350 lb.

$$p_{rappel FS} := 350 \cdot lbf$$

Max rappel weight, selected by applicant

Limit load condition

$$p_{rappel FS} = 350 \cdot lbf$$

$$n_{man} = 3.5$$

p
 rappel_ult $^{:=}$ p rappel_FS $^{\cdot n}$ man n sf

Ultimate load condition

$$p_{rappel ult} = 1837.5 \cdot lbf$$

$$p_{rappel FS} = 350 \cdot lbf$$

$$n_{man} = 3.5$$

$$n_{sf} = 1.5$$

Ultimate vertical reaction on roof fitting at FS 105.1

Flight Station where rappel load is applied

$$R_{FS105.1} := \frac{p_{rappel_ult} \cdot (131.0 - rappel_FS)}{131.0 - 105.1}$$

$$R_{FS105.1} = 1298.3 \cdot lbf$$

Where:

$$rappel_FS = 112.7$$

MS :=
$$\frac{P \text{ allow_FS105.1}}{R \text{ FS105.1}^{n} \text{ ff}} - 1$$

$$MS = 0.005$$

Where:

 $P_{allow FS105.1} = 1500 \cdot lbf$

Ultimate vertical reaction on floor fitting at FS 131.0

$$R_{FS131.0} := \frac{p_{rappel_ult} \cdot (rappel_FS - 105.1)}{131.0 - 105.1}$$

$$R_{FS131.0} = 539.2 \cdot lbf$$

Where:

$$p_{rappel_ult} = 1837.5 \cdot lbf$$

$$rappel_FS = 112.7$$

$$MS := \frac{P_{allow_FS131.0}}{R_{FS131.0} \cdot n_{ff}} - 1$$

$$MS = 2.467$$

Where: $P_{allow_FS131.0} = 2150 \cdot lbf$

Assume rappler and gear weighs maximum of 300 lb.

$$p_{rappel FS} = 300 \cdot lbf$$

Max rappel weight, selected by applicant

$$p$$
 rappel $\lim_{n \to \infty} p$ rappel FS^{n} man

Limit load condition

$$p_{rappel FS} = 300 \cdot lbf$$

$$n_{man} = 3.5$$

$$p \text{ rappel_ult } = p \text{ rappel_FS} \cdot n \text{ man} \cdot n \text{ sf}$$

Ultimate load condition

$$p_{rappel ult} = 1575 \cdot lbf$$

$$p_{rappel FS} = 300 \cdot lbf$$

$$n_{man} = 3.5$$

$$n_{sf} = 1.5$$

Ultimate vertical reaction on roof fitting at FS 105.1

Flight Station where rappel load is applied

$$R_{FS105.1} := \frac{p_{rappel_ult} \cdot (131.0 - rappel_FS)}{131.0 - 105.1}$$

$$R_{FS105.1} = 1301.4 \cdot lbf$$

$$p_{rappel ult} = 1575 \cdot lbf$$

rappel
$$FS = 109.6$$

MS :=
$$\frac{P_{allow_FS105.1}}{R_{FS105.1} \cdot n_{ff}} - 1$$

$$MS = 0.002$$

Where:
$$P_{allow FS105.1} = 1500 \cdot lbf$$

Ultimate vertical reaction on floor fitting at FS 131.0

$$R_{FS131.0} := \frac{p_{rappel_ult} \cdot (rappel_FS - 105.1)}{131.0 - 105.1}$$

$$R_{FS131.0} = 273.6 \cdot lbf$$

$$rappel_FS = 109.6$$

MS :=
$$\frac{P_{allow}_{FS131.0}}{R_{FS131.0} \cdot n_{ff}} - 1$$

$$MS = 5.832$$

Where:
$$P_{allow_FS131.0} = 2150 \cdot lbf$$

Critical bending load on Rappel Bar occurs when load applied to mid-point of span

$$M_{max} := \frac{1}{4} \cdot p_{rappel_ult} \cdot (131.0 \cdot in - 105.1 \cdot in)$$

$$M_{\text{max}} = 10198.1 \cdot \text{lbf} \cdot \text{in}$$

Occuring at mid-point

Where:

$$p_{rappel ult} = 1575 \cdot lbf$$

$$p_{rappel FS} = 300 \cdot lbf$$

Section Properties of Rappel Tube

OD :=
$$1.250 \cdot in$$

Tube outside diameter

$$w := 0.156 \cdot in$$

Tube wall thickness

$$ID := OD - 2 \cdot w$$

Tube inside diameter

$$ID = 0.938 \cdot in$$

$$I := \frac{\pi}{4} \cdot \left[\left(\frac{OD}{2} \right)^4 - \left(\frac{ID}{2} \right)^4 \right]$$

Moment of Inertia of tube

$$I = 0.082 \cdot in^4$$

$$OD = 1.25 \cdot in$$

$$ID = 0.938 \cdot in$$

Allowable Modulus of Rupture for 4130 Rappel Tube

$$L := 131.0 \cdot in - 105.1 \cdot in$$

Length of rappel tube

$$L = 25.9 \cdot in$$

$$\frac{OD}{w} = 8.013$$

D/t ratio

$$F_b := 135000 \cdot psi$$

Modulus of Rupture, Ref: Mil-Hdbk-5E, page 2-222

Bending Stress in Tube

$$f_{b_{max}} = \frac{M_{max} \cdot \frac{OD}{2}}{I}$$

$$f_{b_{max}} = 77879.2 \cdot psi$$

M
$$_{\text{max}} = 10198.1 \cdot \text{lbf} \cdot \text{in}$$

$$w = 0.156 \cdot in$$

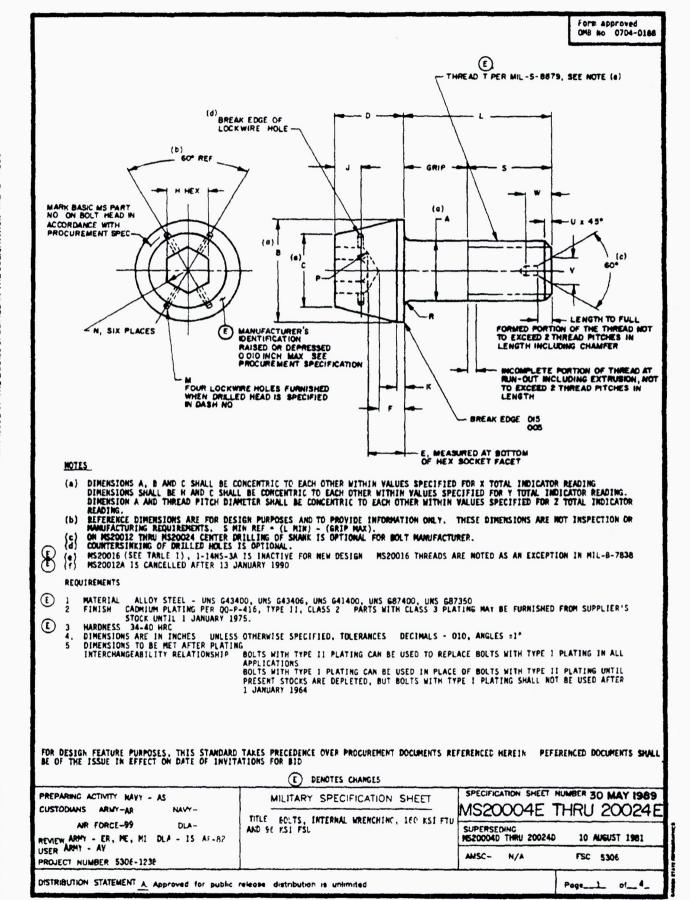
$$I = 0.082 \cdot in^4$$

$$p_{rappel_FS} = 300 \cdot lbf$$

$$MS := \frac{F_b}{f_{b_max} \cdot n_{ff}} - 1$$

$$MS = 0.507$$

1



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																Υ
]
	(E)			TABLE 1	BOL	T DIMEN	SIONS A	ND TENSI	LE STR	ENGTH					
BASIC MS PART ND	(a) TH	_	(a)	A DIA	(a) B DIA		(a) C DIA	D	Ε	F	(a) HEX	J	K	+,005 - 000	N MAX RAD
N\$20004	1/4-28		MAX 24	M1N 92 .2477	438	MIN 428	.342	.250	.112	068	.1900	1880	078	-	.037	.010
M\$20005 M\$20006 M\$20007 M\$20008	5/16-24 3/8-24 7/16-20	UNJF-3A UNJF-3	.37 A .43	42 3727	750	521 639 740	.520 534	312 375 438	.183 208	116 141	3150	.3130	.094 .125 .156	063		011
M\$20009 M\$20010	9/16-18 5/8-18	UNJF-3A	A .56	16 5596 40 6220	938 1 050	928 1 040	.625 .723 826	500 562 625	.247 .279 317	. 190 216	,3785 4410 5035	.3755 4380 .5005	.156 .172 .203 234			019
MS20012 MS20014 MS20016 •	3/4-16 7/8-14		.87	37 .8707	1 438	1 428		.875	385 450	.273 327	5660 6295	5630 6257	.344	094	055	
MS20017 MS20018	1 -12 1-1/8-12 1-1/4-12	UNJF-3A	A 1 12			1.615 1 865 2 115	1.249	1.000 1 125 1.250	.527 .589 .667	381 443 475	7547	7507	453 500	100	-	.022
MS20022 MS20024	1-3/8-12 1-1/2-12 3/4-14-1	UNJF-3	A 1 37	4 11.370	2.313	2 303 2 490	1 768	1.375	.748 .823	531 .586 .273	1 131	1.126	500 -547 594 -281	.125	7	
							ABLE I	(CONT)						E SE	E NOTE (f)
BASIC MS	P		P	(b) S MIN	U ±.016	(c) V	1 1	c) N AX	(b) (c CENTER Drill		TENSILE	CONC	(a) Entrici	TY		ı
PART NO	MAX	MIN		MIN REF	2.070				SIZE REF		B MIN	X	Y	2		T
MS20004 MS20005			.041	.031 .47		+	\pm	_		=	6.190 9.820 15.200 20.600	.005 .006	.007 .008 .010	0045		
M\$20006 M\$20007 M\$20008 M\$20009 M\$20010	020	010	.057	047 .78		E					20,600 27,400 34,600	.009	.01 .02	.006		
N250015				.85 .91 1.03	062	-	37	200	2		43,600 63,200 86,100	.011 .012 .015 .018	.016 .018 .022			
M\$20014 M\$20016 • M\$20017	030	015	073	1 28	078	25	50	260	3		12,000 14,000 44,000	.020	.025	.009		
M\$20018 M\$20020 M\$20022			089	.077 1.72	094	.3	12	320	4		19,000	.022 .025 .028	.032	.012		
M\$20024 -M\$20012A			073	963 0.734 (OGE SEE NOT		,	200			63,200 63,200	030 015	018			1
* SEE	NOTE (=)					•										
																1
PREPARING A	CTIVITY N	AVY - A	5		М	LITAR	Y SPE	CIFICA	TION SH	HEET	SP	ECIFICATIO	N SHEE	T NUMB	ER 30 MA	Y 1989
CUSTODIANS	CUSTODIANS ARMY- AP NAVY- TITLE BOLTS, INTERNAL MPENCHINC, 160 KS1 FTU MS20004E THRU 20024E								X024E							
REVIEW ARMY	ARMY - EP, ME, MI DLA - IS AF-80 MS200040 THRU 200240 10 AUGUST 1981															
PROJECT NUMBER 5306-1233																
DISTRIBUTION	STATEME	M A 40	proved	for public	release, d	stnbuti	on is un	limited						Pa	94	01

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EMOUS EDITIONS OF THIS FORM ARE DIBBOLETE

102 6,375																Form ap OMB No	proved 0704-0188
ASSA (21) S22000 18/20						TABLE	II DAS	1 NOS , 1	GRIP LEN	GTHS AND	BOLT LE	NGTH			•		
275 750						MS20007		M\$20009	MS20010			M\$20016	MS20017				
1	1	.250	.750			//16	1/2	9/16	5/8	3/4	7/8	1	1	1-1/8	1-1/4	1-3/8	1-1/2
12	8	500	1.000	1 062	1 188			1 600	1 562	41.055							
Section 1.50		750	1 250	1.312	1 438	1.562	1 562	1 625	1.688	1 812	2 062					 	
20 1:50	16	1 000	1 500	1.562	1 688	1 812	1 812	1.875	1 938	2 062	2 188			2 625			-
28 152 2,152 7,152 7,158 7,152 7,158 7,152 7,155 7,15	20	1.250	1 750	1 812	1 938	2 052	2 062	2 125	2 188	2 312	2 438	2.562	2 562	2 750		3 125	
28 750 2:50 2:31 2:48 2:52 5:62 5:62 5:62 5:62 5:62 5:62 5:62 5:62 5:62 5:62 5:63		1 500	2 000	2.062	2 188	2.312	2 312	2 375	2 438	2.562	2.688	2 812	2.812	3.000	3 125 3 250	3 250	
22 1.00 2.50 2.52 2.68 2.81 812 813 823 315 3163 3173 3.112 3.50 3.675 3.760 3.875 3.760 3.875 3.760 3.875 3.760 3.875 3.760 3.875 3.760 3.875 3.760 3.875 3		1 750	2.250	2 312	2 438	2 688	2 562	2 625	2 688	2 812 2 938	2 938	3 062	3 062	3 250	3.375	3 500	3 625
38 1 - 171	32 34	2.000	2 500 2 625	2 562 2.688	2 688 2 812	2 938	2 812 2 938	2 875 3 000	2 938 3 062	3.062	3 312	3 312 3 438	3.312 3 438		3 750	3.875	
42 2 ct 3 125 3 186 3.112 3 48 3 438 3 500 3 562 3 652 3 6	38	2.375	2.875	2.938		3 188	3.188	3,250	3 312	3 438	3 562	3 688	3 688	3 875	4 000	4 125	4.250
46. 2 e73: 3 375: 3 438: 3 562 3 688: 3 688: 3 750 1 812: 3 338: 4 062 4 188 4 188 4 375 4 500 4 625 4 750 1 875 502 3 125 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	42	2 625	3 125	3 188	3.312	3 438	3 438	3 500	3 562	3 688	3 812	3.938	3 938	4 125	4 250	4 375	4 500
50 3 125 3 162 3 188 3 812 3 938 1,938 4,000 4 062 4 186 4,312 4 438 4 438 4 428 4 438 4 625 4 750 4 875 5 000 5 125 5 25 5 5 5 5 1 812 3 938 4,000 4 062 4 186 4	46	2 875	3 375	3,438	3 562	3 688	3.688	3,750	3 812	3 938	4 062	4 188	4.188	4.375	4 500	4 625	4.750
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6.6 4. 1/25 4. 6/25 4. 6/26 4.		3 875	4,375	4 438	4 562	4 688	4_688	4 750	4 812	4.938	5 062	5 188	5 188	5 375	5 500	5.625	5.750
70 4 375 4 875 4 938 5.062 5 188 5 112 5 312 5 438 5.562 5 688 5 688 5.887 6 6000 6 125 6.250 6 375 7.2 4 500 5 000 5 602 5 188 5 112 5 312 5 313 5 438 5.562 5 688 5 5.882 5 500 5 6.000 6 125 6.250 6 375 7.4 4.750 5.250 5 312 5 438 5.382 5 335 5 438 5.562 5 688 5 5.882 5 502	66	4.125	4,625	4.688	4.812	4.938	4 938	5 000	5.062	5 188	5.312	5 438	5.438	5 625	_5 750	5 875	6 000
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98 6.125 7,000 7,062 7,188 7,312 7,438 7,438 7,438 7,438 7,755 8,000 8,125 8,250 102 6,375 7,125 7,188 7,112 7,438 7,562 7,550 7,875 8,000 8,125 8,250 102 6,375 7,250 7,312 7,438 7,562 7,568 7,688 7	94	5 875	6,375	6 438	6 562	6 688	6.688	6 750	6.812	6 938	7 062	7.188	7 188	7 375	7.500	7.625	7 750
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REPARING ACTIVITY NAVY - AS STATEMENT OF THE PROPERTY OF THE P														9 250	9 375	9 500	9 625
REPARING ACTIVITY NAVY - AS USTODIANS ARMY AP NAVY- AR FORCE-99 DLA- EVIEW ARMY - EP, ME, MI DLA - 15 AF-8° SER APMY - AV ROJECT NUMBER 5306-123E MILITARY SPECIFICATION SHEET MS20004E THRU 20024E SPECIFICATION SHEET NUMBER 30 MAY 1965 MS20004E THRU 20024E SUPERSEDING MS20004D THRU 20024D 1C AUGUST 1981 AMSC- N/A FSC 5306																	
USTODIANS ARMY AP NAVY- AR FORCE-99 DIA- EVIEW ARMY - EP, ME, MI DIA - 15 AF-8° SER APMY - AV ROJECT HUMBER \$306-123E MS20004E THRU 20024 SUPERSEDING MS20004D THRU 20024D 1C AUGUST 1981 AMSC- N/A FSC \$306	E *APPLIES TO MS20012A ONLY.																
AR FORCE-99 DLA- EVIEW ARP7 - EP, ME, MI DLA - IS AF-8° SER APMY - AV ROJECT NUMBER \$306-1238 SUPERSEDING M\$200040 THRU 200240 1C AUGUST 1981 AMSC- N/A FSC \$306																	
EVIEW ARMY - EP, ME, MI DLA - IS AF-8° SER APMY - AV ROJECT NUMBER \$306-1238 MS20004D THRU 20024D 1C AUGUST 1981 AMSC- N/A FSC \$306	AMP FORCE- GO DIA- DULIS, INTERNAL MERCETAL, TOURST FILE																
KOZECT HUMBER 5305-1235	MS20004D THRU 20024D 1C AUGUST 1981 USER APMY - AV AMSC - N/A FSC 2005																
STRIBUTION STATEMENT A approved for public release distribution is unimited Page 1 of 4																	

UNASSIGNED DASH NUMBERS SHALL NOT BE USED, EXCEPT THOSE DASH NUMBERS COVERED BY THE FOLLOWING CODING NOTE

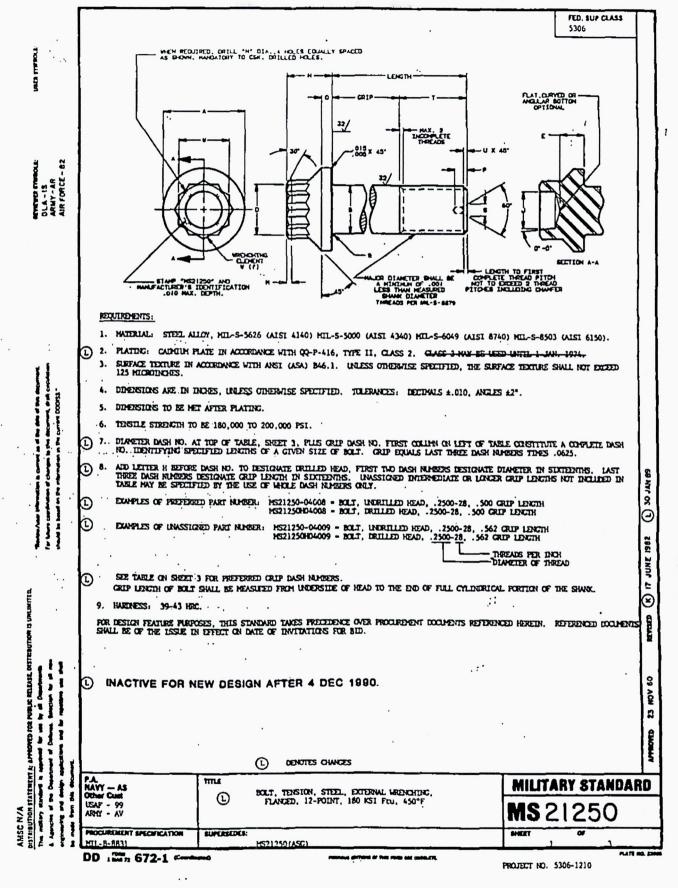
DASH NUMBERS INDICATE PREFERRED GRIP LENGTHS IN 125 INCREMENTS INTERMEDIATE GRIP LENGTHS BETWEEN THOSE LENGTHS LIETED, MAY BE SPECIFIED IN .062 INCREMENTS BY INTERMEDIATE DASH NUMBERS LENGTH AND GRIP OF A BOLT WITH AA OOD NUMBER FOR THE DASH NUMBER WILL BE .062 GREATER THAN SHOWN FOR THE BOLTS WITH THE PRECEDING EVEN DASH NUMBER ONLY BOLT DIAMETER FOR WHICH THERE ARE QUALIFIED PRODUCTS LISTED ON QPL-7838 SHALL BE USED FOR DESIGN

FOR EASH BOLT DIAMETER GRIP LENGTHS GREATER OR LESS THAN THOSE BESIGNATED BY ASSIGNED DASH NUMBERS ON TABLE II ARE INACTIVE FOR DESIGN

ADD "H" BEFORE DASH MUMBER FOR BOLT WITH DRILLED HEAD

EXAMPLES OF PART NUMBERS MS20017-18 = 1-12 BOLT, 2.438 INCH LONG, 1.125 INCH GRIP, UNDRILLED HEAD. MS20017H18 = 1-12 BOLT, 2.438 INCH LONG, 1.125 INCH GRIP, DRILLED MEAD.

PREPARING ACTIVITY NAVY - AS	MILITARY SPECIFICATION SHEET	SPECIFICATION SHEET NUMBER 30 MAY 1989						
CUSTODIANS ARMY- AR NAVY-		MS20004E THRU 20024E						
AIR FORCE- 99 DLA- REVIEW ARMY - ER, ME, MI DLA - 15 AF-82	TITLE BOLT - INTERNAL WRENCHING, 160 KS; FTU AND 96 KSI FSL	SUPERSEDING MS20004D THRU 20024D 10 AUGUST 1981						
USER ARMY - AV PROJECT NUMBER 5306-123F		AMSC- N/A FSC 5306						
DISTRIBUTION STATEMENT A Approved for public release distribution is unlimited Page								



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	FEO. SUP CLASS 5306																	
	GRIP GRIP DIAMETER DASH NUMBERS DASH *.010 02 03 04 05 06 07 08 09 10 12 14 16 18 20 22 24																	
- 1	NO.		02 03 04 05 06 07 08 09 10 12 14 16 18 20 22 24															
	004	,250	.655	.690	.762	.849	.895	.991	1.038									
- 1	004 006 008	.375	.780 .905	.813	1 012	974	1,020	1,116	1,163	1,247	1,294	1,431	1.764	1.999	2.170		2,530	
- 1	010	,623	1,636	1.665	1,137	1.224	1.270	1.366	1.413	1,497	1,344	1.681	1.889	2,124	2,295	2.405	2,530 2,655	2,655
- 1	012	.875	1.280	1 715	1.187	1 474	1.5201	1.616	1.661	1.747	1.794	1.931	2.1391	2.374	12.545	12.655	12.780	12.903
1	016	1 000	1 405	1 440	1 517	7 300	1.645	1.741	1.788	1.872	1.919	2.056	2.264	2.499	12.670	12.780	12.905	13.030
1	018	1.250	1 655	1 690	1 767	1 849	1 4951	1.991	2.038	2.122	2.169	2.306	12.514	12.749	12.920	13.030	3.030	13.280
- I	022	1.375	1 780	1 815	1 887	1 974	2.020	7.116	2.163	2.247	2.294	2.431	2.639	2.874	3.045	3,15	3,280	3,405
ا يُ و	024	1.625	2.030	2.065	2.137	2.224	2.270	2.366	12.413	2.497	2.544	2.681	12.889	3.124	1.3.295	3.40:	3.405	3.655
ARMY - AR	028	1.750	2 155	2 190	2 262	2.349	2.395	2.491	2.538	2.622	2.669	2.806	3.014	3.249	3.420	3.530	3.655	3.780
5 K	030	2.000	2,280	2,315	2.387	2.474	2.520	2.741	2,663	2.747	2.794	1.056	3,139	3,374	3,545	3.780	3.780	4.030
₹ ₹	034	2,125	2.530	2.565	2.637	2.724	2.770	2.866	2.913	2.997	3.044	3.181	3,389	3.624	3.795	3.90	4.030	4.155
- 1	1016	2,18X 2,250	7 655	7 600	7 757	7 840	2.833 7.895	7.991	3.038	3.722	1.169	3,306	3.514	3.749	3.920	4:030	4.155	4,280
1	038	2.375	2,780	2.815	2,887	2,974	3,020	3.116	3.163	3,247	3,294	3.431	3,639	3.874	4,045	4,15	4.280	4,405
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Bopine.	044	2.750	3.155	1.190	1.262	3.349	3.395	3.491	3.538	3.622	1.669	3.806	4.014	4.249	14.470	14.53	0 4.65	14.780
•.	048	3.000	3,405	3.440	3.512	3.599	3.645	3.741	13.788	13.872	13.919	4.056	4.264	4.49	1 4.670	4.78	0 4.90	5 . 030
•	050	1 175	3 530	1.565	1.617	3.724	3.770	1.866	3.913	3.997	4.044	4.181	4.389	4.624	4.795	4.90	5 5.030	3.15
	052	1 175	3 780	1 214	1 487	9 974	A . D20	4.116	4.163	14.247	14.294	4.431	14.639	4.67	1 3.04	1 3.13	0 3.15 5 5.28	7 2.40:
:	056	3,500	3.905	3.940	4.012	4.099	4.145	4.241	4.288	4.372	4.419	4.556	4.764	4,99	915.170	3,28	0 3,40	3.33
	058	3,625	4.030	4.065	4.137	4,224	4,270	4,366	4.413	4 622	4.669	4,681	5.014	3.124	5.295		5 5.530 0 5.655	
	062	3.875	4.280	4.315	4.387	4.474	4.520	4.616	4.663	4.747	4.794	4.931	15.139	15.374	15.545	5.65	5 5.780	5.90
:		4.000	4.405	4.440	4.512	4.599	4.645	4.741	4.788	4.872	4.919	5.056	5.264	5.49	5.670	5.78	0 5,905	6,030
	066	4.125	4.655	4.690	4.762	4.724	4.895	4.991	5.038	5.122	5.169	5.306	5.514	5.74	5.920	6.03	5 6.030 0 6.15	6.280
	070	4.375	4.780	4.815	4.687	14.974	5.020	5.116	5.163	5.247	5.294	15.431	5.639	15.874	16.04	16.15	5 6.280	16.40
•	072	4.500	4.905	4.940	3.012	3.099	5.145	5.241	5.288	5.372	5.544	5.556	15.889	6.12	4 6.29	6.40	5 6.53	6.65
	076	4.750	5.155	5.190	5,262	5,349	5.395	15.491	5.538	5.622	15.669	15.806	6.014	6.24	9 6,420	6.53	0 6.65	16.780
	078	4.875	5.405		5.387	3.474	5.520	3.616	5.663	5.747	15.794	6.056	6.139	6.49	9 6.670	6.78	5 6,780 0 6,90	7.030
	082	5.125	5.530	3.365	5.637	3.724	5.770	5.866	5.913	5.997	6.044	6,181	6.389	6,62	16.79	6.90	5 7.030	7.15
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	088	5.500	5.905	5.940	16.012	6.099	6.145	6.241	16.288	6.37	6.419	6.556	6.764	6.99	9 7. 17	0 7.28	017,40	5 7.53
	090	5.625	6,030	6,065	6,137	6,224	6,270	6.366	6.41	6.49	6.544	6,681	6.889	7.12	4 7.29	5 7 40 0 7 53	5 7.33 0 7.65	017.65 5 7 28
1	092	15.875	16.280	16.315	6.387	16.474	16.520	16.616	16.663	116.74	716.794	16.931	17,139	17,37	4 7.54	317.63	217,75	017.90
- 1	096	6.000	6.405	6.440	6.512	6.599	6.645	6.741	6,788	16.87	216.919	17.056	517.264	17.49	917.67	017.78	017.90	518.03
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WEMENT SPECIFICATION MIL-B-8831 DD . "672-1 (Confinence)

TITLE

SUPERSEDES.

BOLT, TENSION, STEEL, 180 KSI FTU, 450°F, 12 POINT, EXTERNAL WRENCHING FLANGED

MS21250(ASG)

MSI 53 - Review of Supplemental Instructions for Continued Airworthiness

APPENDIX A-3 NORMAL CATEGORY ROTORCRAFT - CAR 529

ICA 758.90 REV 1

BLOCK 1

Name of the applicant for the design change approval:

Aero Design Ltd.

Description of the design change:

Installation of Rappel Mount Provision, Cargo Arm and Rappel Step on Bell 205A-1/205B/212/412

Certification Basis of design change and revision date:

FAR 29, Amendment 29-2

CAR Standard A529.1(c) Program showing how changes to supplemental ICA made by the applicant or by the manufacturers of products and appliances installed in the aeroplane pursuant to the design change will be distributed:

Section 0-3 of Supplemental ICA (ICA 758.90)

Installation Drawing 75801/79201/79801

BLOCK 2

Note: Enter "N/A" when no supplemental ICA are needed.

CAR Standard 513.05 (1) (g) (iv): Installation Instructions:

Regulatory Standard Reference Column 1	Design Approval Holder (DAH) ICA Reference Column 2	Applicant Means of Compliance Supplemental ICA Requirements Column 3
A529.2 (a) Manual(s) (a) The Instructions for Continued Airworthiness must be in the form of a manual or manuals as appropriate for the quantity of data to be provided.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manuals, BHT-205A1-MM-1 BHT-205B-MM BHT-212-MM BHT-412-MM	Supplemental ICA ref: Single Manual (ICA758.90)
A529.2 (b) Practical arrangement (b) The format of the manual or manuals must provide for a practical arrangement.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual	Supplemental ICA ref: Arranged in ATA format
A529.3 The Instructions for Continued Airworthiness must contain the following manuals or sections, as appropriate, and information:		
A529.3 (a) Rotorcraft maintenance manual or section		
A529.3 (a) (1) (Introduction) (1) Introduction information that includes an explanation of the rotorcraft's features and data to the extent necessary for maintenance or preventive maintenance.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 1	Supplemental ICA ref: Section 0-1

MSI 53 – Review of Supplemental Instructions for Continued Airworthiness

Regulatory Standard Reference Column 1	Design Approval Holder (DAH) ICA Reference Column 2	Applicant Means of Compliance Supplemental ICA Requirements Column 3
A529.3 (a) (2) (Description) (2) A description of the rotorcraft and its systems and installations including its engines, rotors, and appliances.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 1	Supplemental ICA ref: Section 0-5
A529.3 (a) (3) Control & Operation (3) Basic control and operation information describing how the rotorcraft components and systems are controlled and how they operate, including any special procedures and limitations that apply.	ICA ref: N/A	Supplemental ICA ref: N/A
A529.3 (a) (4) Servicing (4) Servicing information that covers details regarding servicing points, capacities of tanks, reservoirs, types of fluids to be used, pressures applicable to the various systems, location of access panels for inspection and servicing, locations of lubrication points, lubricants to be used, equipment required for servicing, tow instructions and limitations, mooring, jacking, and levelling information.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 12	Supplemental ICA ref: N/A
A529.3 The Instructions for Continued Airworthiness must contain the following manuals or sections, as appropriate, and information:		
A529.3 (b) Maintenance Instructions. A529.3 (b) (1) Scheduling 1) Scheduling information for each part of the rotorcraft and its engines, auxiliary power units, rotors, accessories, instruments, and equipment that provides the recommended periods at which they should be cleaned, inspected, adjusted, tested, and lubricated, and the degree of inspection, the applicable wear tolerances, and work recommended at these periods. However, the applicant may refer to an accessory, instrument, or equipment manufacturer as the source of this information if the applicant shows that the item has an exceptionally high degree of complexity requiring specialized maintenance techniques, test equipment, or expertise. The recommended overhaul periods and necessary cross-references to the Airworthiness Limitations section of the manual must also be included. In addition, the applicant must include an inspection program that includes the frequency and extent of the inspections necessary to provide for the continued airworthiness of the rotorcraft.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 5	Supplemental ICA ref: Section 5-1

MSI 53 - Review of Supplemental Instructions for Continued Airworthiness

Regulatory Standard Reference Column 1	Design Approval Holder (DAH) ICA Reference Column 2	Applicant Means of Compliance Supplemental ICA Requirements Column 3
A529.3 (b) (2) Troubleshooting (2) Troubleshooting information describing probable malfunctions, how to recognize those malfunctions, and the remedial action for those malfunctions.	ICA ref: N/A	Supplemental ICA ref: N/A
A529.3 (b) (3) Removal/replacement (3) Information describing the order and method of removing and replacing products and parts with any necessary precautions to be taken.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 25	Supplemental ICA ref: Section 25
A529.3 (b) (4) General (4) Other general procedural instructions including procedures for system testing during ground running, symmetry checks, weighing and determining the center of gravity, lifting and shoring, and storage limitations.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 7 and 8	Supplemental ICA ref: N/A
A529.3 (c) Access (c) Diagrams of structural access plates and information needed to gain access for inspections when access plates are not provided.	ICA ref: N/A	Supplemental ICA ref: N/A
A529.3 (d) Special inspections (d) Details for the application of special inspection techniques including radiographic and ultrasonic testing where such processes are specified.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 5	Supplemental ICA ref: N/A
A529.3 (e) Protective treatment (e) Information needed to apply protective treatments to the structure after inspection.	ICA ref: Bell Standard Practices Manual BHT-ALL-SPM, Chapter 3	Supplemental ICA ref: Section 5-3
A529.3 (f) Fasteners, torque values, etc (f) All data relative to structural fasteners such as identification, discard recommendations, and torque values.	ICA ref: Bell Standard Practices Manual BHT-ALL-SPM, Chapter 2	Supplemental ICA ref: Section 25-70
A529.3 (g) Special tools (g) A list of special tools needed.	ICA ref: N/A	Supplemental ICA ref: N/A

MSI 53 - Review of Supplemental Instructions for Continued Airworthiness

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Note: The statement in block 5 does not constitute an approval of the Airworthiness Limitations Section. Airworthiness Limitations differ from other maintenance tasks, in that they are mandatory, as a direct condition of the approval of the type design. They are therefore referenced directly in the approval document itself. However, they must also be included in the Supplemental Instructions for Continued Airworthiness.

hey are mandatory, as a direct condition of the approval of the included in the Supplemental Instructions for Continue		ectly in the approval document useri. However, they must also
A529.4 AWL - Separate Section 1 The Instructions for Continued Airworthiness must contain a section titled Airworthiness Limitations that is segregated and clearly distinguishable from the rest of the document. This section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure approved under 529.571. If the Instructions for Continued Airworthiness consist of multiple documents, the section required by this paragraph must be included in the principal manual. This section must contain a legible statement in a prominent location that reads: "The Airworthiness Limitations section is approved by the Minister and specifies maintenance required by any applicable airworthiness or operating rule unless an alternative program has been approved by the Minister."	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 4	Supplemental ICA ref: Chapter 4
BLOCK 4 - Applicant Statement of Compliance		
The Supplemental ICA referenced above comprises that supports this change in type design.	the complete listing of supplemental ICA necess	sary to show compliance with the regulatory standard

The Supplemental ICA referenced above comprises the complete listing of supplemental ICA necessary to show compliance with the regulatory standard that supports this change in type design.

Applicants Signature:

Date: 7677, 908

BLOCK 5 – Minister's Statement of Acceptability		
The design change is adequately supported by existing ICA and/or supplemental ICA, as	identified above and is acceptable to the	ne Minister.
Reviewer's Name: G. Ouchanen Phone # (403) 292-4990 Email:	Mail Routing Symbol: RA	
Signature: 2008-06-09	C-LSH08-157/D	(-08-0363 NAPA Number
* COOPEDINATED REVIEW WITH MALCOLM STEWART -	RACH.	

MSI 53 – Review of Supplemental Instructions for Continued Airworthiness

APPENDIX A-3 NORMAL CATEGORY ROTORCRAFT - CAR 529

BLOCK 1

Name of the applicant for the design change approval:

Aero Design Ltd.

Description of the design change:

Installation of Rappel Mount Provision, Cargo Arm and Rappel Step on Bell 205A-1/205B/212/412

Certification Basis of design change and revision date:

FAR 29, Amendment 29-2

CAR Standard A529.1(c) Program showing how changes to supplemental ICA made by the applicant or by the manufacturers of products and appliances installed in the aeroplane pursuant to the design change will be distributed:

Section 0-3 of Supplemental ICA (ICA 758.90)

Installation Drawing 75801/79201/79801

CAR Standard 513.05 (1) (g) (iv): Installation Instructions:

BLOCK 2

Note: Enter "N/A" when no supplemental ICA are needed.

Regulatory Standard Reference Column 1	Design Approval Holder (DAH) ICA Reference Column 2	Applicant Means of Compliance Supplemental ICA Requirements Column 3
A529.2 (a) Manual(s) (a) The Instructions for Continued Airworthiness must be in the form of a manual or manuals as appropriate for the quantity of data to be provided.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manuals, BHT-205A1-MM-1 BHT-205B-MM BHT-212-MM BHT-412-MM	Supplemental ICA ref: Single Manual (ICA758.90)
A529.2 (b) Practical arrangement (b) The format of the manual or manuals must provide for a practical arrangement.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual	Supplemental ICA ref: Arranged in ATA format
A529.3 The Instructions for Continued Airworthiness must contain the following manuals or sections, as appropriate, and information:		
A529.3 (a) Rotorcraft maintenance manual or section		
A529.3 (a) (1) (Introduction) (1) Introduction information that includes an explanation of the rotorcraft's features and data to the extent necessary for maintenance or preventive maintenance.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 1	Supplemental ICA ref: Section 0-1

MSI 53 – Review of Supplemental Instructions for Continued Airworthiness

Regulatory Standard Reference Column 1	Design Approval Holder (DAH) ICA Reference Column 2	Applicant Means of Compliance Supplemental ICA Requirements Column 3
A529.3 (a) (2) (Description) (2) A description of the rotorcraft and its systems and installations including its engines, rotors, and appliances.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 1	Supplemental ICA ref: Section 0-5
A529.3 (a) (3) Control & Operation (3) Basic control and operation information describing how the rotorcraft components and systems are controlled and how they operate, including any special procedures and limitations that apply.	ICA ref: N/A	Supplemental ICA ref: N/A
A529.3 (a) (4) Servicing (4) Servicing information that covers details regarding servicing points, capacities of tanks, reservoirs, types of fluids to be used, pressures applicable to the various systems, location of access panels for inspection and servicing, locations of lubrication points, lubricants to be used, equipment required for servicing, tow instructions and limitations, mooring, jacking, and levelling information.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 12	Supplemental ICA ref: N/A
A529.3 The Instructions for Continued Airworthiness must contain the following manuals or sections, as appropriate, and information:		
A529.3 (b) Maintenance Instructions. A529.3 (b) (1) Scheduling 1) Scheduling information for each part of the rotorcraft and its engines, auxiliary power units, rotors, accessories, instruments, and equipment that provides the recommended periods at which they should be cleaned, inspected, adjusted, tested, and lubricated, and the degree of inspection, the applicable wear tolerances, and work recommended at these periods. However, the applicant may refer to an accessory, instrument, or equipment manufacturer as the source of this information if the applicant shows that the item has an exceptionally high degree of complexity requiring specialized maintenance techniques, test equipment, or expertise. The recommended overhaul periods and necessary cross-references to the Airworthiness Limitations section of the manual must also be included. In addition, the applicant must include an inspection program that includes the frequency and extent of the inspections necessary to provide for the continued airworthiness of the rotorcraft.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 5	Supplemental ICA ref: Section 5-1

MSI 53 - Review of Supplemental Instructions for Continued Airworthiness

Regulatory Standard Reference Column 1	Design Approval Holder (DAH) ICA Reference Column 2	Applicant Means of Compliance Supplemental ICA Requirements Column 3
A529.3 (b) (2) Troubleshooting (2) Troubleshooting information describing probable malfunctions, how to recognize those malfunctions, and the remedial action for those malfunctions.	ICA ref: N/A	Supplemental ICA ref: N/A
A529.3 (b) (3) Removal/replacement (3) Information describing the order and method of removing and replacing products and parts with any necessary precautions to be taken.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 25	Supplemental ICA ref: Section 25
A529.3 (b) (4) General (4) Other general procedural instructions including procedures for system testing during ground running, symmetry checks, weighing and determining the center of gravity, lifting and shoring, and storage limitations.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 7 and 8	Supplemental ICA ref: N/A
A529.3 (c) Access (c) Diagrams of structural access plates and information needed to gain access for inspections when access plates are not provided.	ICA ref: N/A	Supplemental ICA ref: N/A
A529.3 (d) Special inspections (d) Details for the application of special inspection techniques including radiographic and ultrasonic testing where such processes are specified.	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 5	Supplemental ICA ref: N/A
A529.3 (e) Protective treatment (e) Information needed to apply protective treatments to the structure after inspection.	ICA ref: Bell Standard Practices Manual BHT-ALL-SPM, Chapter 3	Supplemental ICA ref: Section 5-3
A529.3 (f) Fasteners, torque values, etc (f) All data relative to structural fasteners such as identification, discard recommendations, and torque values.	ICA ref: Bell Standard Practices Manual BHT-ALL-SPM, Chapter 2	Supplemental ICA ref: Section 25-70
A529.3 (g) Special tools (g) A list of special tools needed.	ICA ref: N/A	Supplemental ICA ref: N/A

MSI 53 – Review of Supplemental Instructions for Continued Airworthiness

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Note: The statement in block 5 does not constitute an approval of the Airworthiness Limitations Section. Airworthiness Limitations differ from other maintenance tasks, in that they are mandatory, as a direct condition of the approval of the type design. They are therefore referenced directly in the approval document itself. However, they must also be included in the Supplemental Instructions for Continued Airworthiness.

A529.4 AWL - Separate Section 1 The Instructions for Continued Airworthiness must contain a section titled Airworthiness Limitations that is segregated and clearly distinguishable from the rest of the document. This section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure approved under 529.571. If the Instructions for Continued Airworthiness consist of multiple documents, the section required by this paragraph must be included in the principal manual. This section must contain a legible statement in a prominent location that reads: "The Airworthiness Limitations section is approved by the Minister and specifies maintenance required by any applicable airworthiness or operating rule unless an alternative program has been approved by the Minister."	ICA ref: Bell 205A-1/205B/212/412 Maintenance Manual, Chapter 4	Supplemental ICA ref: Chapter 4			
BLOCK 4 – Applicant Statement of Compliance					
The Supplemental ICA referenced above comprises the complete listing of supplemental ICA necessary to show compliance with the regulatory standard that supports this change in type design.					
Applicants Signature:		Date:			
Applicants Name: E. Burgoin, P.Eng, DAR 290M					
BLOCK 5 – Minister's Statement of Acceptability					
The design change is adequately supported by exist	ting ICA and/or supplemental ICA, as identified a	bove and is acceptable to the Minister.			
		ail Routing Symbol:			
Signature: Date:					

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS ICA 758.90

Rappel Mount Provision

Cargo Deployment Arm

Rappel Step

Preface

These Instructions for Continued Airworthiness shall be included in the rotorcraft Maintenance Manual when;

- The Rappel Mount Provision assembled in accordance with AERO Design Ltd. Document Control List DCL758-1, Revision 2,
- The Cargo Deployment Arm assembled in accordance with AERO Design Ltd. Document Control List DCL792-1, Revision 2,
- The Rappel Step assembled in accordance with AERO Design Ltd. Document Control List DCL798-1, Revision 1, or later approved revision, is installed.

The information contained herein supplements the information in the basic Maintenance Manual. For Maintenance practices and procedures not contained in these Instructions for Continued Airworthiness refer to the basic Maintenance Manual and its approved supplements.

Revision 1
Original Date: 07 May, 2008

Revision Date: 16 June, 2008

<u>AERO Design Ltd.</u> Engineering Consultants 2013 – 39th Avenue N.E., Calgary, Alberta T2E 6R7 Phone: (403) 250-8027

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RECORD OF REVISIONS

Revision Number	Issue Date	Date Inserted	Ву
0			Original Issue
1	16 June 2008	16 June 2008	R. Rathwell

LIST OF EFFECTIVE PAGES

List of Revisions	Revision 1 (Original Issue)	16 June. 2008

List of Effective Pages

Description	<u>Pages</u>	Revision No.
Cover	1	1
Revision Record/List of Effective Pages	2	1
Table of Contents	3	1
00-00-00	4-6	1
04-00-00	7	1
05-00-00	8-15	1
11-00-00	16-17	1
25-00-00	18-23	1
APPENDIX A	24-30	1

AERO Design Ltd.	ICA 758.90
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CARGO DEPLOYMENT ARM – INSTALLATION

RAPPEL MOUNT PROVISION - INSTALLATION

CARGO DEPLOYMENT ARM – REMOVAL

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CHAPTER 0 – INTRODUCTION

0-1 SCOPE

The following Instructions for Continued Airworthiness (ICA) satisfy the requirements of 14 CFR 29.1529, and provide the information necessary to complete the on-going maintenance and inspections required for rotorcraft embodying the Rappel Mount Provision, Cargo Deployment Arm and Rappel Step as described herein.

0-2 DEFINITIONS AND ABBREVIATIONS

ICA -

Instructions for Continued Airworthiness

LH -

Left Hand

RH -

Right Hand

ID-

Inside Diameter

BELL-IPB

Bell Helicopters Illustrated Parts Book - Specific to each model

0-3 DISTRIBUTION

Copies of this ICA and amendments shall be distributed to all known purchasers of the Rappel Mount Provision, Cargo Deployment Arm and Rappel Step. Requests for a copy may be made in writing to:

AERO Design Ltd. 2013 39th Avenue N.E. Calgary, Alberta T2E 6R7

Fax: 403-250-8333

Email: info@aerodesign.ca

Any changes will be sent to Transport Canada. All changes will be recorded in the Record of Revisions page at the front of this document.

0-4 COMPATIBILITY

Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated will not adversely affect the airworthiness of the helicopter.

0-5 GENERAL DESCRIPTION

Rappel Mount Provision

The Rappel Mount Provision Installation is a steel tube structure that mounts on the existing hardpoints of the helicopter roof structure.

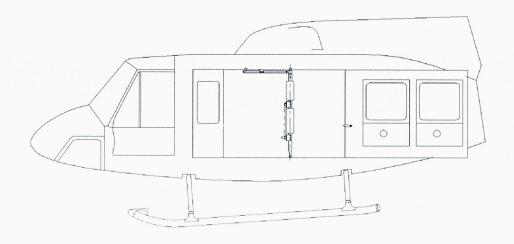


Figure 0-5.1 – Rappel Mount Provision Installation

Cargo Deployment Arm

The Cargo Deployment Arm Installation is an aluminum beam that mounts on the existing rear seat post stanchion of helicopter.

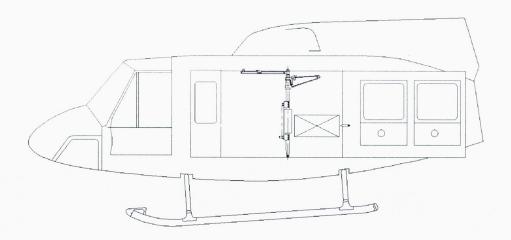


Figure 0-5.2 – Cargo Deployment Arm Installation

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Rappel Step

The Rappel Step Installation is an aluminum beam that attaches to the existing external hardpoints on the helicopter.

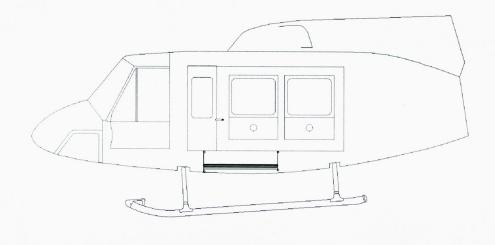


Figure 0-5.3 – Rappel Step Installation

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CHAPTER 4 - AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is Transport Canada-approved and specifies maintenance required under Section 571 of the Canadian Aviation Regulations, unless an alternative program has been approved.

No additional airworthiness limitations have been imposed due the installation of the Rappel Mount Provision.

No additional airworthiness limitations have been imposed due the installation of the Cargo Deployment Arm.

No additional airworthiness limitations have been imposed due the installation of the Rappel Step.

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CHAPTER 5 – INSPECTION REQUIREMENTS

5-1 INSPECTION SCHEDULE

Continued airworthiness is contingent upon compliance with the following inspection items. These items shall be completed in conjunction with the rotorcraft Maintenance Inspection schedule, or other approved program, or upon removal and replacement of any component of the Rappel Mount Provision, Cargo Deployment Arm or Rappel Step. Scheduled Inspections consist of:

- 1. Daily Inspections Accomplished daily before flight operations, and
- 2. 300 Hour/180 Day Inspections Accomplished each 300 hours of flight operation or after 180 calendar days, whichever comes first.

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5-2 DAMAGE LIMITS / REPAIR INSTRUCTIONS

If damage is found in the inspections above, repair in accordance with the instructions below.



DO NOT REPAIR DAMAGE TO THE RAPPEL MOUNT PROVISION, CARGO DEPLOYMENT ARM OR RAPPEL STEP IF BEYOND THE LIMITS BELOW.

DATA	INSPECTION TASK DESCRIPTION		INITIAL	
REFERENCE	AND COMPONENT REPAIR/REPLACE ORDERS	MECH	OTHER	
	RAPPEL MOUNT PROVISION		6	
	DAILY INSPECTION			
DRAWING 75801	a. Inspect the attachment of the Rappel Mount Provision to the helicopter roof tiedown studs for condition and security. Ensure the stud fittings are fully engaged onto the helicopters roof tiedown studs and are locked.			
	b. Inspect the gate mechanism for functionality. The gate should open smoothly and close automatically with the spring force only.			
	300 HOUR/180 DAY INSPECTION			
DRAWING 75801 75820	1. Rappel Mount Provision Installation;			
	a. Visually inspect the security of the Rappel Mount Provision to the Stanchion Post. If assembly movement at the stanchion post is detected, inspect the stanchion post, bolt (p/n AN4-24A) and Stanchion Adapter (p/n 75833-01) for wear. Replace worn part.			
	b. Visually inspect Stud Fittings. If cracked, corroded, worn or broken, replace part (p/n 33115 KINEDYNE).			
BELL-IPB	c. Visually inspect Adapter (MS22034-2) at the bottom of the Stanchion Post. If cracked, corroded, worn or broken, replace part.			
BELL-IPB	d. Visually inspect the helicopter roof and floor tiedown studs associated with this installation. If cracked, corroded, worn or broken, replace part per Bell-IPB.			

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INSPECTION TASK DESCRIPTION AND COMPONENT REPAIR/REPLACE ORDERS	INIT MECH	TAL OTHER
2. Rappel Mount Provision Assembly;		
a. Visually inspect the fasteners, including the fastening of the stud fittings to the helicopter roof tiedown studs and the adapter at the bottom of the stanchion post to the helicopter floor tiedown stud for security and condition. Replace as necessary.		
b. Visually inspect the opening and closing operation of the gate mechanism;		
i. Gate mechanism must close automatically under the springs force only. Burrs and other sources of resistance may be dressed-out. Replace gate spring (p/n 24704 DYNALINE) if necessary.		,
ii. Gate mechanism must open freely. Burrs and other sources of resistance may be dressed-out.		
c. Visually inspect the Retainer for cracks, corrosion or other damage Nicks and/or gouges up to 0.030" deep and 0.125" wide may be dressed out to a smooth contour.		
d. Visually inspect the all other aluminum components – Guide, Stanchion Adapter, and Curved Washer for cracks, corrosion or other damage Nicks and/or gouges up to 0.063" deep and 0.125" wide may be dressed out to a smooth contour.		
e. Visually inspect the Rappel Tube for cracks, corrosion or other damage - Nicks and/or gouges up to 0.030" deep and 0.125" wide may be dressed out to a smooth contour.		
f. Check all bolts for security and torque. Refer to Section 25-70.		
	2. Rappel Mount Provision Assembly: a. Visually inspect the fasteners, including the fastening of the stud fittings to the helicopter roof tiedown studs and the adapter at the bottom of the stanchion post to the helicopter floor tiedown stud for security and condition. Replace as necessary. b. Visually inspect the opening and closing operation of the gate mechanism; i. Gate mechanism must close automatically under the springs force only. Burrs and other sources of resistance may be dressed-out. Replace gate spring (p/n 24704 DYNALINE) if necessary. ii. Gate mechanism must open freely. Burrs and other sources of resistance may be dressed-out. c. Visually inspect the Retainer for cracks, corrosion or other damage Nicks and/or gouges up to 0.030" deep and 0.125" wide may be dressed out to a smooth contour. d. Visually inspect the all other aluminum components – Guide, Stanchion Adapter, and Curved Washer for cracks, corrosion or other damage Nicks and/or gouges up to 0.063" deep and 0.125" wide may be dressed out to a smooth contour.	AND COMPONENT REPAIR/REPLACE ORDERS 2. Rappel Mount Provision Assembly; a. Visually inspect the fasteners, including the fastening of the stud fittings to the helicopter roof tiedown studs and the adapter at the bottom of the stanchion post to the helicopter floor tiedown stud for security and condition. Replace as necessary. b. Visually inspect the opening and closing operation of the gate mechanism; i. Gate mechanism must close automatically under the springs force only. Burrs and other sources of resistance may be dressed-out. Replace gate spring (p/n 24704 DYNALINE) if necessary. ii. Gate mechanism must open freely. Burrs and other sources of resistance may be dressed-out. c. Visually inspect the Retainer for cracks, corrosion or other damage Nicks and/or gouges up to 0.030" deep and 0.125" wide may be dressed out to a smooth contour. d. Visually inspect the all other aluminum components — Guide, Stanchion Adapter, and Curved Washer for cracks, corrosion or other damage Nicks and/or gouges up to 0.063" deep and 0.125" wide may be dressed out to a smooth contour. e. Visually inspect the Rappel Tube for cracks, corrosion or other damage - Nicks and/or gouges up to 0.030" deep and 0.125" wide may be dressed out to a smooth contour.

DATA	INSPECTION TASK DESCRIPTION	INITIAL	
REFERENCE	AND COMPONENT REPAIR/REPLACE ORDERS	MECH	OTHER
	CARGO DEPLOYMENT ARM		
	DAILY INSPECTION		
DRAWING 79201 79220	a. Inspect the attachment of the seat post stanchion to the helicopter tiedown studs for condition and security. Ensure the floor adapter is fully engaged onto the helicopter floor tiedown stud and is locked. Ensure the stud fittings are fully engaged onto the helicopters roof tiedown studs and are locked.		
	b. Inspect the locking leaver for functionality. The leaver should open smoothly and close automatically with the spring only.		
	c. Inspect the pivoting of the Cargo Deployment Arm. The Cargo Arm should pivot smoothly about the seat post stanchion.		
	300 HOUR/180 DAY INSPECTION		
DRAWING 79201 79220	1. Cargo Deployment Arm Installation;		
	a. Visually inspect the security of the Cargo Deployment Arm to the Stanchion Post. When locked, the cargo arm sideward motion limit at the furthest point from the stanchion is +/- 0.25". If this motion is detected, inspect the stanchion post, bolt (p/n AN4-26A), Locking Leaver (p/n 79235-01) and Bearing Sleeve (p/n 79231-01) for wear. Replace worn part.		
	b. Visually inspect the Stud Fittings. If cracked, corroded, worn or broken, replace part (p/n 33115 KINEDYNE).		
BELL-IPB	c. Visually inspect Adapter (MS22034-2) at the bottom of the Stanchion Post. If cracked, corroded, worn or broken, replace part.		7
BELL-IPB	d. Visually inspect the helicopter roof and floor tiedown studs associated with this installation. If cracked, corroded, worn or broken, replace part per Bell-IPB.		
	2. Stanchion Post;		
	a. Visually inspect the Seat Post Stanchion for cracks, corrosion or other damage.		

DATA	INSPECTION TASK DESCRIPTION	INITIAL	
REFERENCE	AND COMPONENT REPAIR/REPLACE ORDERS	MECH	OTHER
DRAWING 79220	3. Cargo Deployment Arm Assembly; a. Bushing – 79233-01;		
	 a) Bushing must not rotate or move within the aluminum cargo arm. b) 3/16 roll-pin must be in place. c) Visually inspect the bushing for cracks, corrosion or other damage - Nicks and/or gouges up to 0.030" deep and 0.125" wide may be dressed out to a smooth contour. 		
	b. Locking Mechanism; a) Visually inspect the locking operation for the deployed and stowed position;		
	i. Locking Leaver must engage automatically under the locking springs force. Burrs and other sources of resistance may be dressed-out. Replace Locking Spring (p/n 24704 DYNALINE), Ball Bearing (Dia. 0.500in) if necessary.		
	ii. Locking Leaver must disengage with little resistance. Burrs and other sources of resistance may be dressed-out.		
	iii. Locking Leaver must rotate smoothly about the locking leaver bushing. Replace bushing (p/n 79237-02), bushing (p/n 79237-01), bolt (p/n AN4-10A) if worn. iv. Engagement of the Locking Leaver into the Bearing Sleeve must prevent the cargo arm from pivoting about the Bearing Sleeve When locked, the cargo arm sideward motion limit at the furthest point from the bearing sleeve is +/- 0.25". If this motion is detected, inspect the Locking Leaver (p/n 79235-01) and Bearing Sleeve (p/n 79231-01) for wear. Replace worn part.		
	v. Touch up aluminum components with polyurethane paint as required following repairs.		
	c. Visually inspect Nylon Bushing (p/n 79233-01); a) Minimum wall thickness - 0.100in		
	b) If gouges are detected, inspect mating parts for burrs and contaminates. Replace nylon bushing if gouge exceeds minimum wall thickness allowable.		
	d. Visually inspect Nylon Bushing (p/n 79234-01). a) Minimum wall thickness - 0.100in		
	b) If gouges and detected, inspect mating parts for burrs and contaminates. Replace nylon bushing of gouge exceeds minimum wall thickness allowable.		

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DATA	INSPECTION TASK DESCRIPTION	INITIAL	
REFERENCE	AND COMPONENT REPAIR/REPLACE ORDERS	MECH	OTHER
DRAWING 79220	e. Visually inspect the Aluminum Cargo Arm (beam) for cracks, corrosion or other damage;		
	a) Flange and Stanchion Post Lugs - Nicks and/or gouges up to 0.063" deep and 0.125" wide may be dressed out to a smooth contour.		
	b) Web - Nicks and/or gouges up to 0.030" deep and 0.125" wide may be dressed out to a smooth contour.		-
	c) Touch up with polyurethane paint as required following repairs.		
	f. Visually inspect the Bearing Sleeve for cracks, corrosion or other damage - Nicks and/or gouges up to 0.030" deep and 0.125" wide may be dressed out to a smooth contour.		
	g. Check all bolts for security and torque. Refer to Section 25-70		

DATA	INSPECTION TASK DESCRIPTION	INITIAL	
REFERENCE	AND COMPONENT REPAIR/REPLACE ORDERS	MECH	OTHER
	RAPPEL STEP		
	DAILY INSPECTION		
DRAWING 79801	a. Inspect the attachment of the Rappel Step to the helicopter hardpoints.		
	300 HOUR/180 DAY INSPECTION		
DRAWING 79820	1. Rappel Step Assembly;		
	a. Visually inspect all components for cracks, corrosion or other damage. Aluminum parts - Nicks and/or gouges up to 0.063" deep and 0.25" wide may be dressed out to a smooth contour. Replace attachment hardware if worn.		
	b. Check all bolts for security and torque. Refer to Section 25-70.		

5-3 PROTECTIVE TREATMENT INFORMATION

1. Rappel Mount Provision

The Rappel Mount Provision is supplied painted white. If the paint is damaged, touch up with white polyurethane paint.

2. Cargo Deployment Arm

The Cargo Deployment Arm is supplied painted white. If the paint is damaged, touch up with white polyurethane paint.

3. Rappel Step

The Rappel Step is supplied painted white. If the paint is damaged, touch up with white polyurethane paint.

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CHAPTER 11 - MARKINGS AND PLACARDS

The following markings and placards are used with the **Rappel Mount Provision Installation** in the locations noted:

Placards 75801-11 and 75801-12 to be in clear view of the pilot

AIRCRAFT MUST BE IN HOVER FOR RAPPEL OPERATIONS

Placard 75801-11

RAPPEL OPERATIONS DURING VFR CONDITIONS ONLY

Placard 75801-12

Placard 75801-13 to be attached to Rappel Mount Provision in clear view of the load master.

MAXIMUM RAPPEL MOUNT CAPACITY 350 LBS (158 KG)

Placard 75801-13

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The following markings and placards are used with the **Cargo Deployment Arm Installation** in the locations noted:

Placards 79201-11 and 79201-12 to be in clear view of the pilot

AIRCRAFT MUST BE IN HOVER FOR CARGO DEPLOYMENT OPERATIONS

Placard 79201-11

CARGO DEPLOYMENT OPERATIONS DURING VFR CONDITIONS ONLY

Placard 79201-12

Placard 79201-13 to be attached to Cargo Deployment Arm in clear view of the load master.

MAXIMUM CARGO DEPLOYMENT ARM CAPACITY 250 LB (113.3 KG)

Placard 79201-13

Placarding is not required for the **Rappel Step Installation**.

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CHAPTER 25 – EQUIPMENT AND FURNISHINGS

25-60 - RAPPEL MOUNT PROVISION

The Rappel Mount Provision Installation may be applied to the right and/or left side of the helicopter.

25-61 RAPPEL MOUNT PROVISION - REMOVAL

REFER TO DRAWINGS 75801 AND 75820

- 1. Remove bearing clips and the associated bearing clip fastening hardware from the stanchion adapter (Figure 25-61-01).
- 2. Unlock the rappel mount provision stud fittings from the helicopter roof tiedown studs and stanchion post adapter from the helicopter floor tiedown stud.
- 3. Remove the AN4 (stanchion) bolt, AN960-416 washers (x2) and MS20365-428 locknut.
- 4. Slide the stanchion adapter into the stanchion post and remove the stanchion post and rappel mount provision from the helicopter.
- 5. Remove the rappel mount provision from the stanchion post.

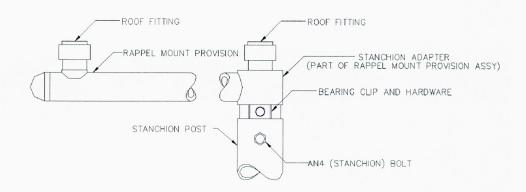


Figure 25-61-01

25-62 RAPPEL MOUNT PROVISION - INSTALLATION

REFER TO DRAWINGS 75801 AND 75820

- 1. Remove the existing stanchion adapter from the helicopter stanchion post.
- 2. Slide the stanchion adapter of the rappel mount provision assembly into the stanchion post.
- 3. Align the stanchion adapter slot and stanchion post bolt hole.

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4. Position the rappel mount provision and stanchion post into the helicopter. Position and lock the stud fittings onto the helicopter roof tiedown studs and the stanchion adapter onto the helicopter floor tiedown stud. See Aero Design Drawing 75801 for position details.

- 5. Install the bearing clips and the associated bearing clip hardware into the stanchion adapter. NOTE: The bearing clip must contact the stanchion post as shown (Figure 25-61-01).
- 6. Install the AN4 (stanchion) bolt, AN960-416 washers (x2) onto stanchion post and stanchion adapter. Secure with the MS20365-428 locknut.

25-63 CARGO DEPLOYMENT ARM

The Cargo Deployment Arm Installation may be applied to the right and/or left side of the helicopter.

25-64 CARGO DEPLOYMENT ARM - REMOVAL

REFER TO DRAWINGS 75820, 79201 AND 79220

- 1. Remove the bearing clips and associated bearing clip fastening hardware from the stanchion adapter (Figure 25-64-01).
- 2. Unlock the rappel mount provision stud fittings from the helicopter roof tiedown studs and stanchion post adapter from the helicopter floor tiedown stud.
- 3. Remove the AN4 (stanchion) bolt, AN960-416 washers (x2) and MS20365-428 locknut.
- 4. Slide the stanchion adapter into the stanchion post and remove the stanchion post, cargo deployment arm and rappel mount provision from the helicopter.
- 5. Slide the rappel mount provision out of the stanchion post.
- 6. Slide the cargo deployment arm assembly off the stanchion post.

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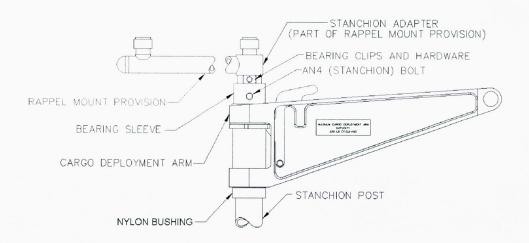


Figure 25-64-01

25-65 CARGO DEPLOYMENT ARM - INSTALLATION

REFER TO DRAWINGS 75820, 79201 AND 79220

1. Remove the existing stanchion adapter and upper pad from the helicopter stanchion post.



THE LHS SIDEWARD FACING SEATS MUST BE REMOVED WHEN INSTALLING THE CARGO DEPLOYMENT ARM ON THE LHS OF THE HELICOPTER.

THE RHS SIDEWARD FACING SEATS MUST BE REMOVED WHEN INSTALLING THE CARGO DEPLOYMENT ARM ON THE RHS OF THE HELICOPTER.

- 2. Slide the cargo arm assembly onto the stanchion post. Align the bearing sleeve, nylon sleeve and stanchion post bolt holes.
- 3. Slide the stanchion adapter of the rappel mount provision assembly into the stanchion post.
- 4. Align the stanchion adapter slot with the stanchion post bolt hole.

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5. Install the AN4 (stanchion) bolt, AN960-416 washers (x2) onto the cargo arm, stanchion post and stanchion adapter. Secure loosely with the MS20365-428 locknut.

- 6. Position the rappel mount provision and stanchion post into the helicopter. Position and lock the stud fittings onto the helicopter roof tiedown studs and the stanchion adapter onto the helicopter floor tiedown stud. See Aero Design Drawing 79201 for position details.
- 7. Install the bearing clips and the associated bearing clip hardware into the stanchion adapter. NOTE: The bearing clip must contact the stanchion post as shown (Figure 25-64-01).
- 8. Secure the AN4 (stanchion) bolt. See Section 25-70 for Torque Values.

25-66 RAPPEL STEP

The Rappel Step Installation may be applied to the right and/or left side of the helicopter.

25-67 RAPPEL STEP - REMOVAL

REFER TO DRAWINGS 79801 and 79820

- 1. Remove the AN5 bolts (x2), AN960-516 washers (x2) and MS20365-524 locknuts (x2) from the mounting plate and the helicopter hardpoints at Fuselage Station 84.46.
- 2. Remove the AN4 bolts (x2), AN960-416 washers (x2) and MS20365-428 locknuts (x2) from the mounting plate and the helicopter hardpoints at Fuselage Station 129.00.
- 3. Remove the Rappel Step from the helicopter.

25-68 RAPPEL MOUNT PROVISION - INSTALLATION

REFER TO DRAWINGS 79801 and 79820

- 4. Align the rappel step bolt holes with the pairs of helicopter hardpoints at Fuselage Station 84.46 and 129.00. Ensure the rappel step mounting plates are on the forward side of the helicopter hardpoints.
- 5. Install the AN4 bolts (x2), through the pair of helicopter hardpoints and mounting plate at Fuselage Station 129.00. Secure with AN960-416 washers (x2) and MS20365-428 locknuts (x2).
- 6. Install the AN5 bolts (x2), through the pair of helicopter hardpoints and mounting plate at Fuselage Station 84.46. Secure with AN960-516 washers (x2) and MS20365-524 locknuts (x2).

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25-69 WEIGHT AND BALANCE

Rappel Mount Provision Installation			Longitudinal		Lateral	
		Weight	Arm	Moment	Arm	Moment
Part #	Name	(lbs)	(in)	(in-lbs)	(in)	(in-lbs)
	Rappel Mount Provision					
75801-01	Installation LHS	7.63	120.4	918.6	-39.5	-301.4
	Rappel Mount Provision					
75801-02	Installation RHS	7.63	120.4	918.6	39.5	301.4

Cargo Deployment Arm Installation			Longitudinal		Lateral	
		Weight	Arm	Moment	Arm	Moment
Part #	Name	(lbs)	(in)	(in-lbs)	(in)	(in-lbs)
	Cargo Deployment Arm					
79201-01	Installation LHS	4.6	135.3	622.4	-39.5	-181.7
	Cargo Deployment Arm					
79201-02	Installation RHS	4.6	135.3	622.4	39.5	181.7

Note: The Cargo Deployment Arm must be installed with the Rappel Mount Provision. Weight and balance data for the Cargo Deployment Arm does not include the weight and balance data for the Rappel Mount Installation. The weight and balance data for the removal of sideward facing seats not included.

Rappel Step Installation			Longitudinal		Lateral	
		Weight	Arm	Moment	Arm	Moment
Part #	Name	(lbs)	(in)	(in-lbs)	(in)	(in-lbs)
79801-01	Rappel Step Installation LHS	9.5	105.22	999.58	-45.18	-429.20
79801-02	Rappel Step Installation RHS	9.5	105.22	999.58	45.18	429.20

Note: Lateral arms are given for right side installation. For installation on left side, lateral arms are negative.

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25-70 STRUCTURAL FASTENER DATA

TORQUE VALUE CHART (DRY) FOR ALL FASTENERS

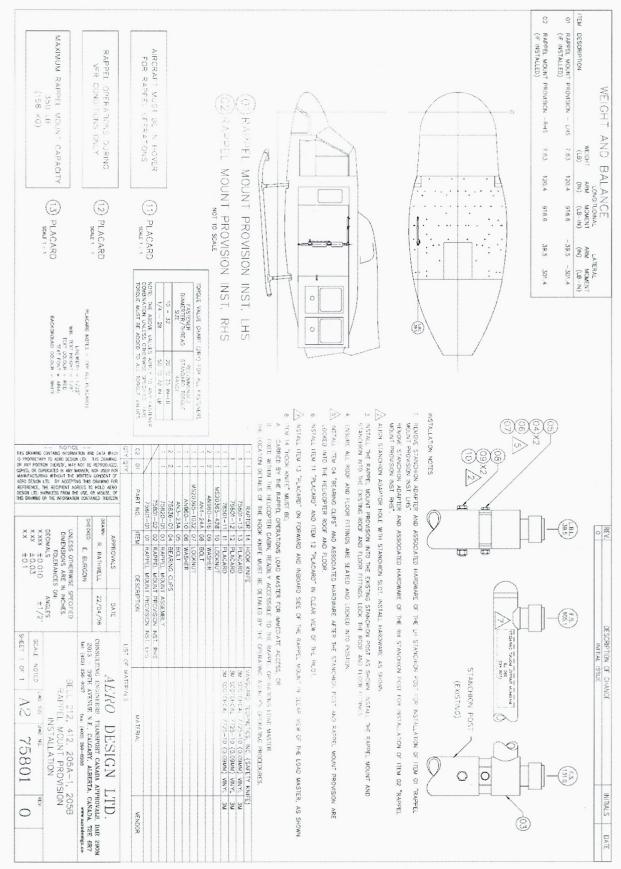
	The Control of the Co		
FASTENER DIAMETER/ THREAD SIZE	RECOMMENDED STANDARD TORQUE RANGE		
10 - 32	20 to 25 in-lb		
1/4 - 28	50 to 70 in-lb		
5/16 - 24	100 to 140 in-lb		
3/8 - 24	160 to 190 in-lb		

NOTE: The above values apply to any fastener combination unless otherwise specified. Tare torque must be added to all torque values.

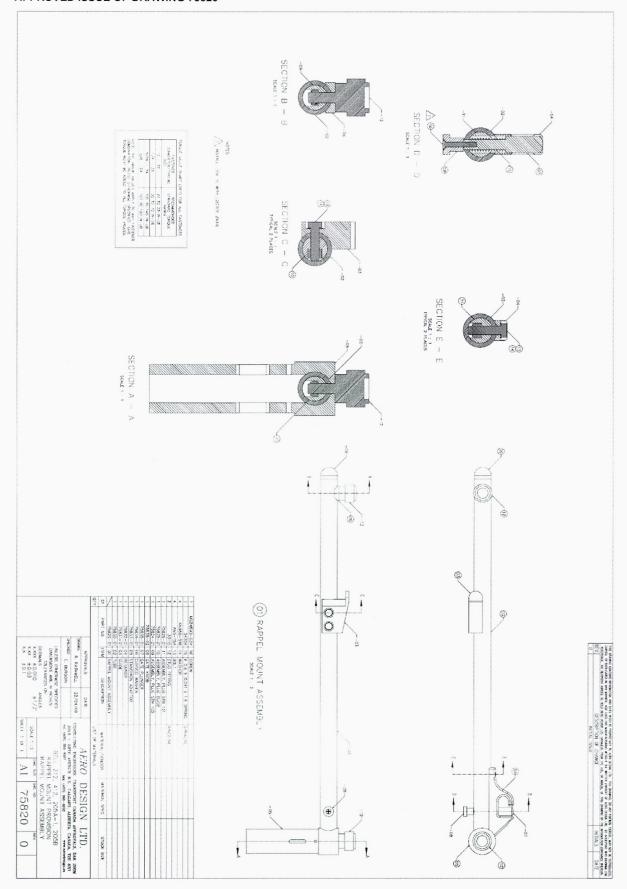
APPENDIX A - REFERENCE DRAWINGS

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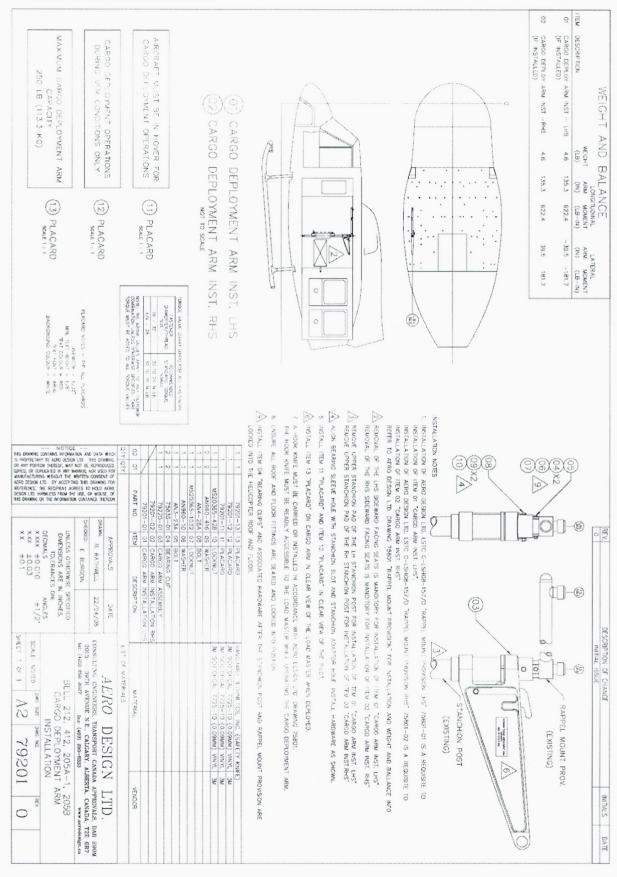
Drawing 75801 - Rappel Mount Provision Installation



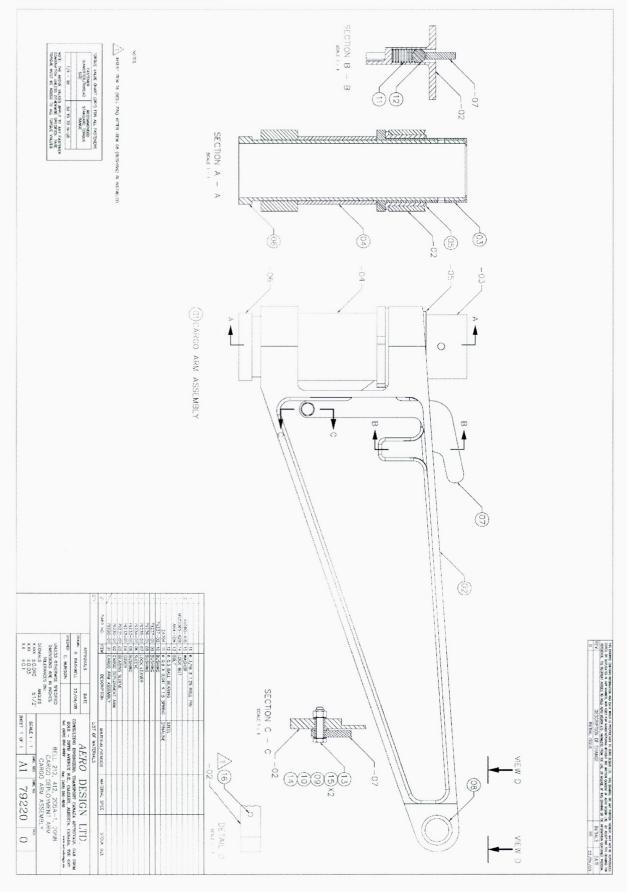
Drawing 75820 - Rappel Mount Provision Assembly



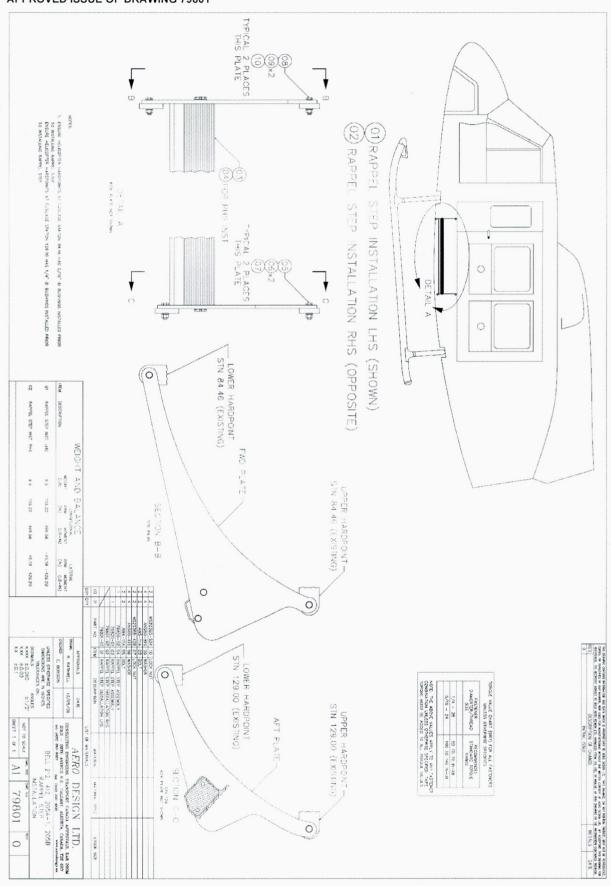
Drawing 79201 - Cargo Deployment Arm Installation



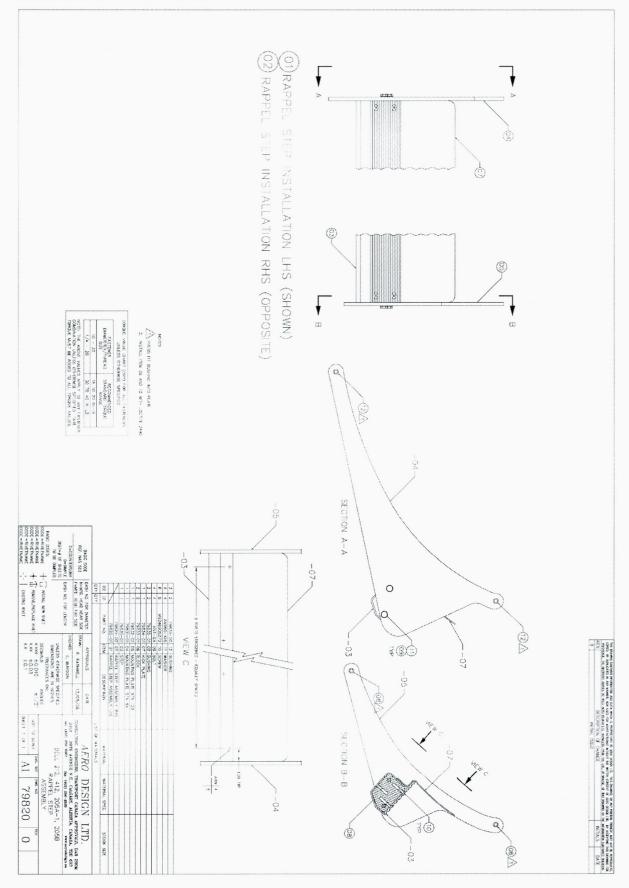
Drawing 79220 - Cargo Deployment Arm Assembly



Drawing 79801 - Rappel Step Installation



Drawing 79820 - Rappel Step Assembly



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ENGINEERING REPORT ER758.01

Rappel Mount Provision

Bell 412, 212, 205A-1, 205B

Approved by: E. Burgoin, P. Eng.

Prepared by: Richard Rathwell

Revision 0 Date: 08 April, 2008

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1.0 INTRODUCTION

This document will show elements the installation of the Rappel Mounting Provision and the Cargo Deployment Arm are in compliance with Federal Aviation Regulations detailed in the Aero Design Ltd. Document CP758-1, *Compliance Program* and Aero Design Ltd. Document CP758-2, *Compliance Program*

The installation provides an aircraft mount for rappelling operations and cargo deployment operations by trained personnel (ie. rappelling fire fighters).

2.0 REFERENCE

AERO Design Ltd. Drawing 75801 Rappel Mount Provision

AERO Design Ltd. Drawing 79201 Cargo Deployment Arm

AERO Design Ltd. Drawing 79801 Rappel Step

AERO Design Ltd. Document CP758-01 Compliance Program

AERO Design Ltd. Document CP758-02 Compliance Program

AERO Design Ltd. Document CP798 Compliance Program

Bell Helicopters RPT-205-099-205

USAAVLABS Technical Report 70-22, Crash Survival Design Guide

USAAVSCOM Technical Report 89-D-22B Aircraft Crash Survival Design Guide, Volume II

Analysis and Design of Flight Vehicle Structures, Bruhn

Fluid Dynamic Drag, Hoerner

MIL-STD-1472D, Human Engineering Design Criteria for Military Systems, Equipment and Facilities

3.0 BASIS OF CERTIFICATION

Bell 412: FAR Part 29 dated 1 February 1965, Amendment 29-1 and 29-2

Bell 212: FAR Part 29 dated 1 February 1965, Amendment 29-1 and 29-2

Bell 205A-1: CAR 7 dated August 1, 1956, Amendments 7-1 through 7-4

Bell 205B: CAR 7 dated August 1, 1956, Amendments 7-1 through 7-4

This installation: FAR Part 29 dated 1 February 1965, Amendment 29-1 and 29-2 and Amendment 29-43 for 29.865(a) and 29.865(e)

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4.0 ANALYSIS OF CURRENT AIRWORTHINESS DIRECTIVES (AD'S)

There are no current AD's related to this project. Refer to appendix A of this document for a list of current AD's.

5.0 STRUCTURAL ANALYSIS - RAPPEL MOUNT PROVISION

5.1 Loads and Factors

Weight of Rappeller: Maximum weight of rappeller per FMS Limitation Wrap := 350-16f

 $\frac{\text{Human External Load}}{\text{Factor:}} \qquad \qquad \text{Per 29.865(a)} \qquad \qquad n_{\text{If}} \coloneqq 3.5$

Safety Factor: Per 29.303 $n_{sf} = 1.5$

Fitting Factor: Per 29.625 $n_{\text{FF}} := 1.15$

Limit Downward Load Factor:

 $n_{v_{lim}} = n_{lf} \cdot n_{ff}$ $n_{v_{lim}} = 4.02$

Limit Downward Load of Rappeller on the Rope:

 $P_{rap_lim} := W_{rap} \cdot n_{v_lim} = 1408.71bf$

Ultimate Downward Load Factor:

 $n_{v_ult} = n_{lf} \cdot n_{sf} \cdot n_{ff}$ $n_{v_ult} = 6.04$

Ultimate Downward Load of Rappeller on the Rope:

 $P_{rap_ult} \coloneqq W_{rap} \cdot n_{v_ult} = 2113.1 \, lbf$

5.2 Reactions

Reactions - At Rope Guide (See Figure 5.2.1)

$$R_{\mbox{guide_lim}} \coloneqq \frac{P_{\mbox{rap_lim}}}{\sin[(90-12)\cdot \mbox{deg}]}$$

The limit load case is used only for analyzing the combined loads on the rappel tube.

$$R_{guide_lim} = 1440.21bf$$

$$R_{guide} := \frac{P_{rap_ult}}{\sin[(90 - 12) \cdot deg]}$$

Ultimate load case

$$R_{guide} = 2160.31bf$$

$$R_{h \text{ guide}} := R_{guide} \cdot \sin(12 \cdot \deg)$$

$$R_{v \text{ guide}} := R_{guide} \cdot \cos(12 \cdot \text{deg})$$

Reactions - Sill

$$R_{sill} := R_{h_guide}$$

$$R_{sill} = 449.21bf$$

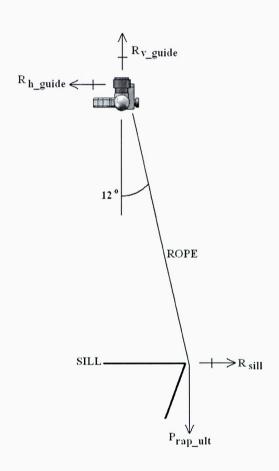


Figure 5.2.1

Reactions - Aircraft Roof Fittings

Roof Fitting Allowables Per Bell Helicopters RPT-205-099-205:

Floor Fitting 30 - Vertical:	$F_{vr} = F_{H30} := 2150 \cdot 1bf$
3	1 T/ HH (II . 1130 101

Floor Fitting 30 - Longitudinal:
$$F_{long FF30} := 2150 \cdot lbf$$

Floor Fitting 30 - Lateral:
$$F_{lat FF30} := 2150 \cdot lbf$$

Roof Fitting 5 - Vertical:
$$F_{V RF5} = 0.1bf$$

Roof Fitting 5 - Longitudinal:
$$F_{long RF5} = 1250 \cdot lof$$

Roof Fitting 5 - Lateral:
$$F_{lat RF5} := 1250 \cdot lbf$$

Roof Fitting 3 - Vertical:
$$F_{v_RF3} = 1500 \cdot lbf$$

Roof Fitting 3 - Longitudinal:
$$F_{long_RF3} = 0.1bf$$

Roof Fitting 3 - Lateral loading allowable has been rationalized with the following assumption:

Bell Helicopters Report 205-099-205 states that roof fitting #3 has an ultimate vertical load allowable of 1500 lbf. A lateral load allowable for roof fitting #3 has not been expressed for reasons unknown.

The position of this document is that an analysis of the roof fitting for a 1500 lbf lateral load, coupled with the defined vertical load allowable note above, would provide sufficient data to know the load allowable for any angle within the vertical-lateral plane.

Lateral load for analysis:

 $P_{1at} := 1500 \cdot 1bf$

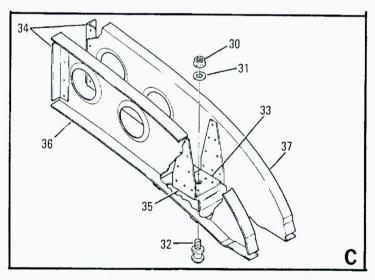


Figure 5.2.2 – Roof Fitting #3, Including Lateral Frames

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Analysis of fitting plate bearing strength:

Plate thickness $t_{plate} \coloneqq 0.090 \cdot in$

Diameter of hole $D_{plate} := 0.375 \cdot in$

Bearing Area:

$$A_{plate_br} := t_{plate} \cdot D_{plate}$$

$$A_{plate_br} = 0.034 \text{ in}^2$$

Stress:

$$\sigma_{
m plate} \coloneqq rac{P_{
m lat}}{A_{
m plate}} \ \sigma_{
m plate} = 44\,{
m ksi}$$

Material Prop. 2024-T3 (bearing) F_{bru. 2024} := 104·ksi

Margin of Safety:

$$MS_{\sigma_plate} := \frac{F_{bru_2024}}{\sigma_{plate}} - 1$$

$$MS_{\sigma_plate} = 1.3$$

MARGIN OF SAFETY IS POSITIVE

Analysis of fitting in shear:

Plate height $h_{plate} := 0.090 \cdot in$

Plate Length $l_{\mathrm{plate}} \coloneqq 1.625 \cdot \mathrm{in}$

Shear Area (2 sides)

$$A_{plate_s} \coloneqq 2(h_{plate} \cdot l_{plate})$$

$$A_{plate_s} = 0.29 \text{ in}^2$$

Stress:

$$\tau_{plate} := \frac{P_{lat}}{A_{plate_s}}$$

$$\tau_{plate} = 5.13 \, ksi$$

Material Prop. 2024-T3 (shear) $F_{su=2024} = 39 \cdot ksi$

Margin of Safety:

$$MS_{\tau_plate} := \frac{F_{su_2024}}{\tau_{plate}} - 1$$

$$MS_{\tau_plate} = 6.6$$

MARGIN OF SAFETY IS POSITIVE

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Analysis of rivets:

Centrod:

(estimated by finding the average distance of the rivets from the base of the fitting bracket)

	DISTANCE
RIVET	FROM
	BASE (IN)

А	3.41
В	2.375
С	2.375
D	1.437
E	1.437
F	0.45
Н	0.45
G	0.45

12.384 SUM OF DIST= IN IN 1.548

AVG DIST OVER 8 RIVETS= (ESTIMATED CENTROID LOCATION FROM BASE)

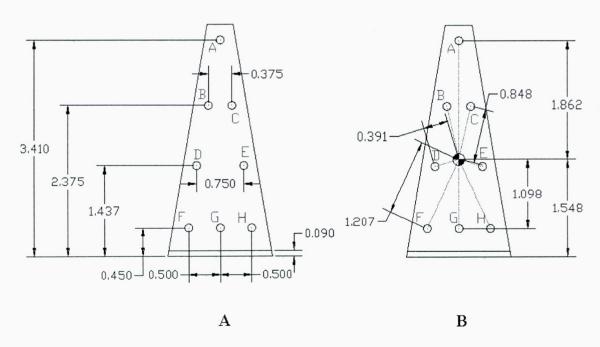


Figure 5.2.3 – Roof Fitting Bracket, Dimensions

Figure 5.2.4 shows the resolved reactions at each fitting (1500 lbf / 8 fittings and eccentric load applied to each fitting)

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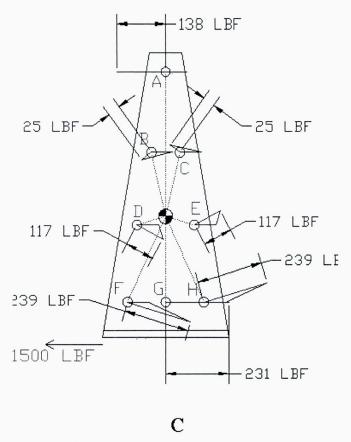


Figure 5.2.4 – Roof Fitting Bracket - Reactions

Eccentric Load Analysis, From Bruhn;

	D	D^2	M	. 1	F
	DISTANCE		MOMENT AT		FORCE
	FROM		CENTROID		$M \times D / I$
			1500# X		
RIVET	CENTROID (IN)	DIST ²	1.55IN	I (IN ²)	(LBF)
Α	1.862	3.47	1162.5	9.33	232
В	0.848	0.72	1162.5	9.33	106
С	0.848	0.72	1162.5	9.33	106
D	0.391	0.15	1162.5	9.33	49
E	0.391	0.15	1162.5	9.33	49
F	1.206	1.45	1162.5	9.33	150
Н	1.206	1.45	1162.5	9.33	150
G	1.098	1.21	1162.5	9.33	137

SUM OF DIST², I = 9.33 IN^2

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The critical load is at rivet "F" and "H" (equal)

Priv critical = 239.1bf

Material Prop. 1/8 "AD4" Rivet (shear)

 $F_{su~AD4} := 389.1bf$

Margin of Safety:

$$MS_{riv_critical} := \frac{F_{su_AD4}}{P_{riv_critical}} - 1$$

MARGIN OF SAFETY IS POSITIVE

Analysis of Lateral Frame

Material Prop. of Lateral Frame:

Bearing Strength, 2024-T3

F_{bru_2024} := 104 ksi

Thickness

 $T_{frame} := 0.025 \cdot in$

Diameter of Rivet Hole (AD4 No. 30 Drill)

 $D_{AD4} := 0.1285 \cdot in$

Bearing Area:

$$A_{br_frame} := D_{AD4} \cdot T_{frame}$$

$$A_{br_frame} = 0.0032 in^2$$

Stress:

$$\sigma_{frame} \coloneqq \frac{P_{riv_critical}}{A_{br_frame}}$$

Margine of Safety:

$$MS_{frame} := \frac{F_{bru}2024}{\sigma_{frame}} - 1$$

$$MS_{frame} = 0.4$$

MARGIN OF SAFETY IS POSITIVE

The lateral frames for roof fitting #3 are identical to the lateral frames for roof fitting #5 and #6. These frames are similar in material type, thickness, general shape and attachment to the same cabin roof longitudinal frame assembly. Roof fitting #5 and #6 share a single pair of lateral frames, with a combined lateral ultimate load allowable of 2500 lbf. Therefore, by comparison, the lateral frames are sufficient to carry the 1500 lbf ultimate lateral load. Furthermore, the cabin roof longitudinal frame assembly would also carry the 1500 lbf ultimate lateral load by the same comparison. See Figure 5.2.5.

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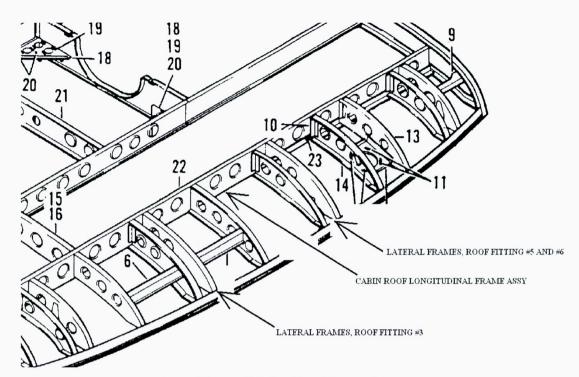


Figure 5.2.5 – Roof Assembly

Vertical Reactions (See Figure 5.2.6)

Assumption: Floor Fitting 30 and Roof Fitting 3 take all vertical loads.

Roof Fitting 3

$$R_{v_RF3} := \frac{R_{v_guide} \cdot 18.0 \cdot in}{25.9 \cdot in}$$

 $R_{v_RF3} = 1468.61bf$

Margin of Safety:

$$MS_{v_RF3} := \frac{F_{v_RF3}}{R_{v_RF3}} - 1$$

 ${\rm MS_{v_RF3}} = 0.021$

MARGIN OF SAFETY IS POSITIVE

Floor Fitting 30

$$R_{v_FF30} := \frac{R_{v_guide} \cdot 7.9 \cdot in}{25.9 \cdot in}$$
 $R_{v_FF30} = 644.5 \text{ lbf}$

Margin of Safety:

$$MS_{v_FF30} := \frac{F_{v_FF30}}{R_{v_FF30}} - 1$$
 $MS_{v_FF30} = 2.336$

MARGIN OF SAFETY IS POSITIVE

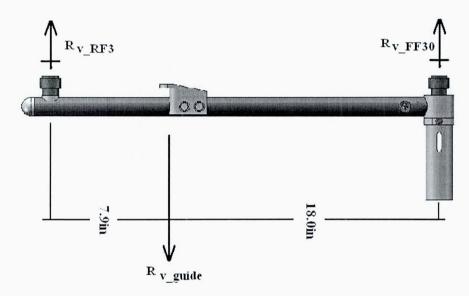


Figure 5.2.6

Stanchion Compression:

$$OD_{stan} := 2.0 \cdot in$$

$$\mathrm{ID}_{\mathtt{stan}} \coloneqq 1.75 \cdot \mathtt{in}$$

Area - Stanchion

$$\mathbf{A_{stan}} := \left(\frac{\mathbf{OD_{stan}}}{2}\right)^2 \cdot \pi - \left(\frac{\mathbf{ID_{stan}}}{2}\right)^2 \cdot \pi$$

$$A_{stan} = 0.7 \, in^2$$

Stress:

$$\sigma_{stan_comp} \coloneqq \frac{R_{v_FF30}}{A_{stan}}$$

$$\sigma_{stan_comp} = 0.9 \, \text{ksi}$$

Horizontal Reactions (See Figure 5.2.7)

Assumption: Roof Fitting 3 and Roof Fitting 5 take all horizontal loads

Roof Fitting 3

$$R_{lat_RF3} \coloneqq \frac{R_{h_guide} \cdot 18.0 \cdot in}{25.9 \cdot in}$$

$$R_{lat RF3} = 312.21bf$$

Margin of Safety:

$$\text{MS}_{\text{lat_RF3}} \coloneqq \frac{\text{F}_{\text{lat_RF3}}}{\text{R}_{\text{lat_RF3}}} - 1$$

$$MS_{1at_RF3} = 3.8$$

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Roof Fitting 5

$$R_{\mbox{\scriptsize lat_RF5}} \coloneqq \frac{R_{\mbox{\scriptsize h_guide}} \cdot 7.9 \cdot \mbox{\scriptsize in}}{25.9 \cdot \mbox{\scriptsize in}}$$

 $R_{1at_RF5} = 1371bf$

Margin of Safety

$$MS_{lat_RF5} := \frac{F_{lat_RF5}}{R_{lat_RF5}} - 1$$

$$MS_{1at_RF5} = 8.1$$

MARGIN OF SAFETY IS POSITIVE

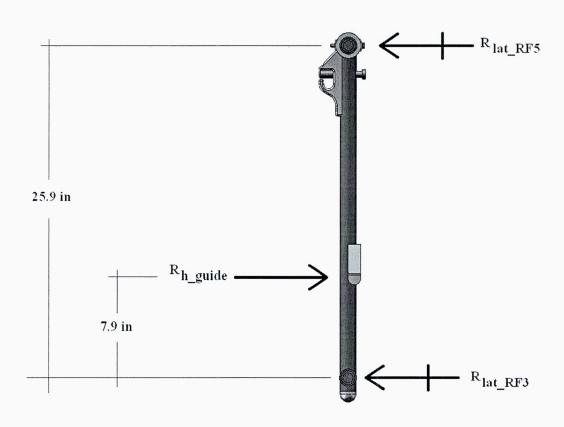


Figure 5.2.7

Reaction - Roof Attach Fittings

Mechanical Properties of 33115 Roof Attach Fitting - per manufacturer specs. (See Appendix C)

$$F_{v_33115} := 5475 \cdot 1bf$$

$$F_{1at 33115} := 2300 \cdot 1bf$$

Margin of Safety (vertical):

$$MS_{v_{2}33115} := \left(\frac{F_{v_{2}33115}}{R_{v_{2}RF3}}\right) - 1$$

$$MS_{v_33115} = 2.7$$

MARGIN OF SAFETY IS POSITIVE

Margin of Safety (lateral):

$$MS_{lat_33115} := \left(\frac{F_{lat_33115}}{R_{lat_RF3}}\right) - 1$$

Critical Case

$$MS_{1at_33115} = 6.37$$

MARGIN OF SAFETY IS POSITIVE

Reaction - Tube Bending (See Figure 5.2.8).

Combined stresses occur on the rappel tube as a result of normal operation.

Figure 5.2.8 "A" shows of a moment reaction on rappel tube.

Figure 5.2.8 "B" shows the rappel tube in compression.

Figure 5.2.8 "C" shows the rappel tube in bending.

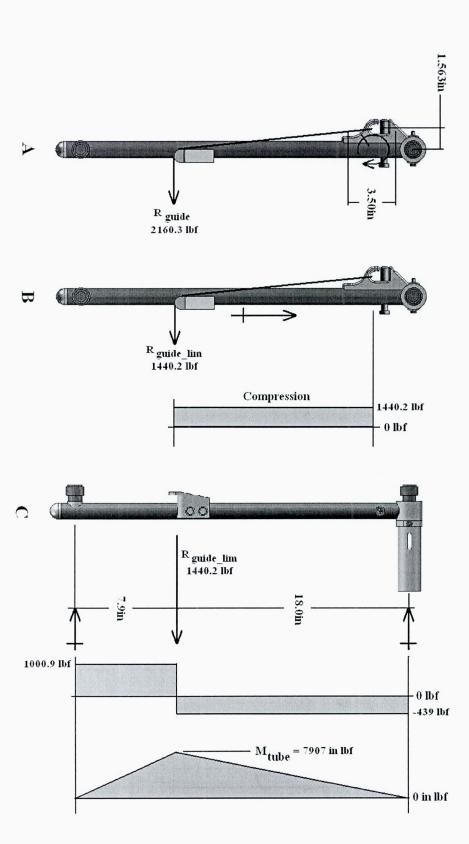


Figure 5.2.8

Moment Reaction through aft bolt (figure 5.2.8 "A"):

$$R_{AN5} := \frac{R_{guide} \cdot 1.563 \cdot in}{3.5 \cdot in}$$
 $R_{AN5} = 964.7 \text{ lbf}$

Margin of Safety:

$$MS_{AN5} := \frac{F_{AN5}}{R_{AN5}} - 1$$
 $MS_{AN5} = 6$

MARGIN OF SAFETY IS POSITIVE

Compression (figure 5.2.8 "B"):

Area - Tube
$$A_{\text{tube}} := 0.544 \cdot \text{in}^2$$

Stress:

$$\sigma_{\text{tube_comp}} = \frac{R_{\text{guide_lim}}}{A_{\text{tube}}}$$
 $\sigma_{\text{tube_comp}} = 2.6 \, \text{ksi}$

Bending Moment (figure 5.2.8 "C"):

$$M_{tube} := \frac{R_{guide_lim} \cdot 7.9 \cdot in}{25.9 \cdot in} \cdot 18 \cdot in$$

$$M_{tube} = 7907.3 in \cdot 1bf$$

Stress:

$$\sigma_{tube_bend} \coloneqq \frac{M_{tube} \cdot c_{tube}}{I_{tube}} = \frac{\sigma_{tube_bend} = 61.8 \, \text{ksi}}{\sigma_{tube_bend}} = \frac{\sigma_{tube_bend}}{\sigma_{tube_bend}} = \frac{\sigma_{$$

Combined Stresses within the tube occur at the rope guide:

$$\sigma_{combined} := \sigma_{tube_bend} + \sigma_{tube_comp}$$

$$\sigma_{combined} = 64.423 \, \mathrm{ksi}$$

Mechanical Properties of 4130N Steel Per MMPDS-01

$$F_{cy_4130N} := 75 \cdot ksi$$

Margin of Safety:

$$MS_{tube} := \left(\frac{F_{cy_4130N}}{\sigma_{combined}}\right) - 1$$

$$MS_{tube} = 0.2$$

MARGIN OF SAFETY IS POSITIVE

DATA FOR THE ULTIMATE LOAD CASE IS NOT AVAILABLE. THE TEST DETAILED IN PARAGRAPH 5.3 VARIFIES THE STRUCTURE OF THE INSTALLATION AT THE ULTIMATE LOAD CASE.

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5.3 Structural Test

A structural test was conducted to simulate a limit and ultimate load onto Rappel Mount Provision. This test was conducted to support the structural analysis findings of this document.

The test set-up applied loads at 12 degrees off-vertical and used the same aircraft roof fitting hardware to mount the tube assembly (see Figure 5.3.1 and Figure 5.3.2)

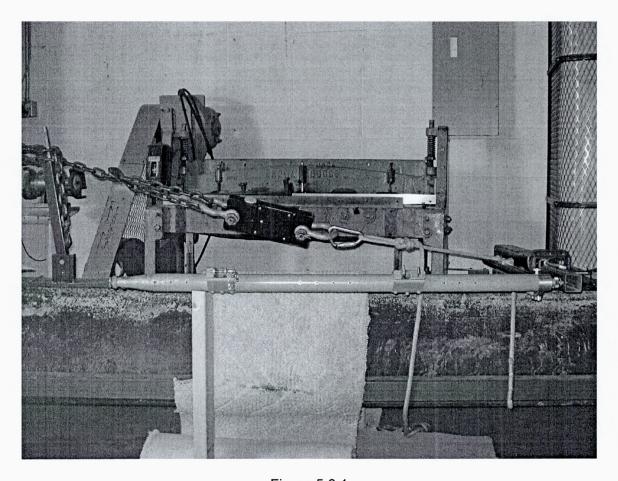


Figure 5.3.1

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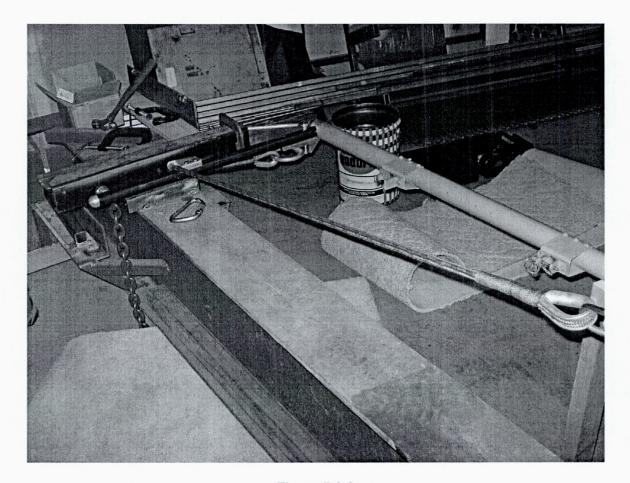


Figure 5.3.2

The test loaded the tube assembly to above limit load (See Figure 5.3.3):

Limit load (resolved load at 12deg) = 1253lbf Test Limit Load = 1280lbf

The tube assembly showed no signs of permanent deformation.

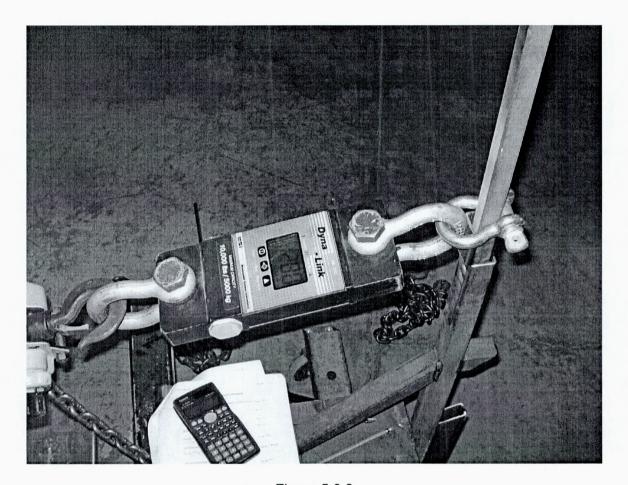


Figure 5.3.3

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The test loaded the tube assembly to above ultimate load (See Figure 5.3.4):

Ultimate load (resolved load at 12 deg) = 1880lbf Test Ultimate Load = 1890lbf

The tube assembly showed no signs of permanent deformation.

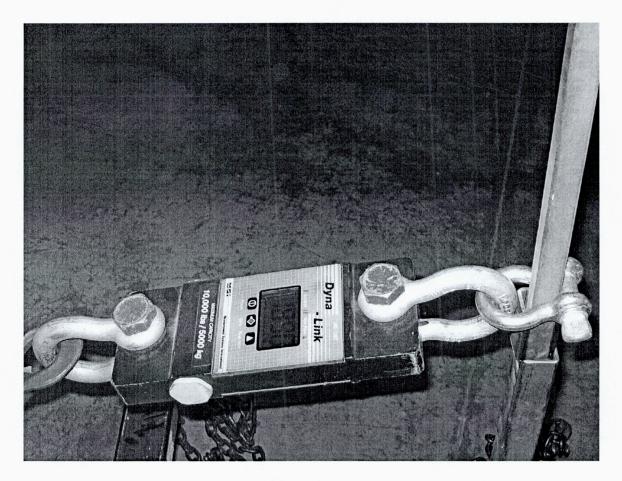


Figure 5.3.4

Results: This test supports the engineering finding in this report.

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6.0 STRUCTURAL ANALYSIS - CARGO DEPLOYMENT ARM

6.1 Loads and Factors

Weight of Cargo:

Maximum weight of Cargo per FMS Limitation

W_{car} := 250·1bf

External Load Factor:

Per AERO Design Ltd.

Note: this load factor exceeds FAR

29.865 of 2.5

Safety Factor:

Per 29.303

 $n_{sf} := 1.5$

 $n_{AD} := 3.0$

Fitting Factor:

Per 29.625

 $n_{ff} := 1.15$

Limit Downward Load Factor:

$$\mathbf{n}_{v_lim} \coloneqq \mathbf{n}_{AD} \cdot \mathbf{n}_{ff}$$

 $n_{v_lim} = 3.45$

Limit Downward Load of Suspended Cargo:

$$P_{car lim} := W_{car} \cdot n_{v lim}$$

 $P_{car_lim} = 862.51bf$

<u>Ultimate Downward Load Factor:</u>

$$\mathbf{n}_{v_ult} \coloneqq \mathbf{n}_{AD} \cdot \mathbf{n}_{sf} \cdot \mathbf{n}_{ff}$$

 $n_{v ult} = 5.17$

Ultimate Downward Load of Suspended Cargo:

$$P_{car_ult} := W_{car} \cdot n_{v_ult}$$

P_{car_ult} = 1293.81bf

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6.2 Reactions

Lug Strength Analysis Under Transverse Loading (See Figure 6.2.1)

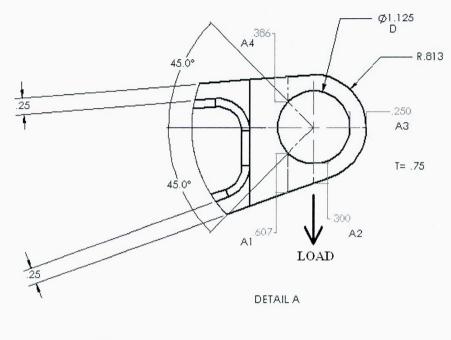




Figure 6.2.1

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From Figure 6.2.1

$$t := 0.75 \cdot in$$

$$D := 1.125 \cdot in$$

$$A1 := t \cdot 0.607 \cdot in$$
 $A1 = 0.455 in^2$

$$A2 := t \cdot 0.300 \cdot in$$
 $A2 = 0.225 in^2$

A3 :=
$$t \cdot 0.250 \cdot in$$
 A3 = $0.187 in^2$

A4 :=
$$t \cdot 0.386 \cdot in$$
 A4 = 0.289 in^2

$$A_{av} := \frac{6}{\frac{3}{A_1} + \frac{1}{A_2} + \frac{1}{A_3} + \frac{1}{A_4}}$$

$$A_{av} = 0.303 \text{ in}^2$$

$$A_{br} := D \cdot t \qquad \qquad A_{br} = 0.844 \, \mathrm{in}^2$$

See Bruhn, Figure D1.15:

$$\frac{A_{av}}{A_{br}} = 0.359$$
 Use Curve 10, Therefore $K_{tu} := 0.343$

Matl Properties of 6061-T6
$$F_{tu_6061} := 42 \cdot ksi$$

From Bruhn, D1.12: Load Capacity of the lug

$$P_{tu} := K_{tu} \cdot A_{br} \cdot F_{tu-6061}$$
 $P_{tu} = 121551bf$

Margin of Safety:

$$MS := \frac{P_{tu}}{P_{car_ult}} - 1$$

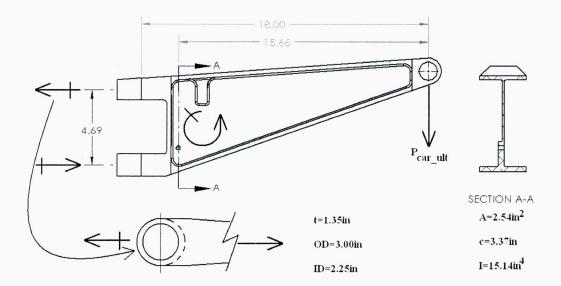
$$MS = 8.395$$

MARGIN OF SAFETY IS POSITIVE

Bending of the Cargo Arm (see Figure 6.2.2)

Note: Bending analysis at location where the M/l ratio is the greatest.

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Moment of Inertia

Bending Moment

 $I_{arm} := 15.14 \cdot in^4$

Centroid

 $c_{arm} := 3.37 \cdot in$

$$\mathbf{M}_{arm} \coloneqq 15.66 \!\cdot\! in \!\cdot\! P_{car_ult}$$

 $M_{arm} = 20260.1 in \cdot 1bf$

Stress

$$\sigma_{arm} := \frac{M_{arm} \cdot c_{arm}}{I_{arm}}$$

 $\sigma_{arm} = 4.5 \, \mathrm{ksi}$

Margin of Safety:

$$MS = \frac{F_{tu}_{6061}}{\sigma_{arm}} - 1$$

MS = 8.3

MARGIN OF SAFETY IS POSITIVE

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Reactions at Stanchion Lugs:

$$R_{top_lug} \coloneqq \frac{P_{car_ult} \cdot 18 \cdot in}{4.69 \cdot in}$$

$$R_{top_lug} = 4965.41bf$$

Analysis of the Cargo Arm Top Stanchion Lug:

$$ID := 2.25 \cdot in$$

$$t_{lug} := 1.35 \cdot in$$

$$\texttt{A}_{\texttt{cs_lug}} \coloneqq (\texttt{OD} - \texttt{ID}) \cdot \texttt{t}_{\texttt{lug}} \qquad \texttt{Cross Sectional Area of Lug}$$

$$A_{cs_lug} = 1.01 \text{ in}^2$$

Stress:

$$\sigma_{top_lug} \coloneqq \frac{R_{top_lug}}{A_{cs_lug}}$$

$$\sigma_{top_lug} = 4.9 \, \mathrm{ksi}$$

Margin of Safety:

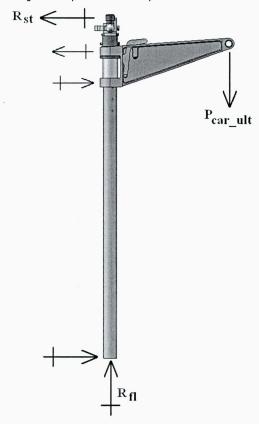
$$\underset{\sigma_{top_lug}}{\text{MS}} = \frac{F_{tu_6061}}{\sigma_{top_lug}} - 1$$

$$MS = 7.6$$

MARGIN OF SAFETY IS POSITIVE

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The vertical load on the Cargo Arm places a compression and a bending moment on the stanchion.



GEOMETRY:

Refer to AERO Design drawings 79201 for further information.

Beam Structure of Arm:	Length of Cargo Arm from the root to the lug at the tip.	$L_{ann} := 18.00 \cdot in$
------------------------	--	-----------------------------

Height of arm
$$h_{ann} := 6.75 \cdot in$$

Stanchion:	Diameter of stanchion.	$D_{\text{stn}} \coloneqq 2.00 \cdot \text{in}$
	Thickness of stanchion tube wall.	$t_{stn} \coloneqq 0.12 \!\cdot\! in$
$d_{\text{stn}} \coloneqq D_{\text{stn}} - 2 \cdot t_{\text{stn}}$	Inside Diameter of stanchion.	$d_{stn} = 1.76 in$
(h.m.)	Total length of stanchion tube from floor to ceiling.	$L_{\text{st}} := 50.7 \cdot \text{in}$
$a := \left(46.6 \cdot in - \frac{h_{amm}}{2}\right)$	Distance from center of lugs down to floor.	a = 43.23 in

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LOADS:

$P_{z} \coloneqq W_{cargo} \cdot n_{z} \cdot n_{sf} \cdot n_{ff}$	Ultimate Vertical Load applied to lug at end of Cargo a	$P_z = 12941bf$
$\mathbf{M}_{\mathbf{ann}} \coloneqq \mathbf{P_z} \cdot \mathbf{L}_{\mathbf{ann}}$	Bending Moment at root of Cargo arm due to vertical lo Ultimate Vertical Load applied to lug at end of Cargo Arm.	ad. $M_{ann} = 23287 lbf \cdot in$ $P_{car_ult} = 1294 lbf$
	Distance between Cargo Arm lug and center of stanchion.	$L_{ann} = 18.00 in$
$M_{st} \coloneqq P_{car_ult} \cdot L_{ann}$	Bending Moment applied to stanchion by vertical load.	$M_{st} = 23287 lbf \cdot in$
	Total length of stanchion tube from floor to ceiling.	$L_{st} = 50.70 \text{in}$
	Distance from center of sleeve down to the floor.	a = 43.23 in
$b := L_{st} - a$	Distance from center of sleeve up to the ceiling.	b = 7.47 in
	Outside Diameter of the stanchion.	$D_{stn} = 2.00 in$
	Inside Diameter of the stanchion.	$d_{stn} = 1.76 in$
$I_{st} := \frac{\pi}{64} \cdot \left(D_{stn}^{-4} - d_{stn}^{-4} \right)$	Moment of Inertia of the stanchion tube.	$I_{st} = 0.31 \text{ in}^4$
$\mathbf{M}_{\text{no_comp}} \coloneqq \frac{\mathtt{a}}{L_{\text{st}}} \cdot \mathbf{M}_{\text{st}}$	Maximum Bending Moment in the stanchion if the compression component of the applied load were to be ignored.	$M_{\text{no_comp}} = 198541\text{bf}\cdot\text{in}$

Bruhn, Equation A5.9 breaks down the bending moment equations into terms that are looked up on Table A5.1, Case VIII. Bending moments on each side of the applied couple are defined differently.

$$j := \sqrt{\frac{E_{2024} \cdot I_{\text{st}}}{P_{\text{car_ult}}}}$$

Axial Load Factor (Ref. Bruhn, Page A5.21).

$$j = 51 in$$

$$C_{1a} \coloneqq (-1) \cdot M_{st} \cdot \frac{cos\left(\frac{b}{j}\right)}{sin\left(\frac{L_{st}}{j}\right)}$$

First term of Eq. A5.9, where x<a.

 $C_{1a} = -27480 \, lbf \cdot in$

 $C_{2a} := 0.1bf \cdot in$

$$M_{a}(x) := C_{1a} \cdot sin\left(\frac{x}{j}\right) + C_{2a} \cdot cos\left(\frac{x}{j}\right)$$

Equation A5.9 with terms C1 and C2 substituted. The term f(w) is ignored because no uniform load is applied.

Bending Moment in stanchion solved just below attachment of Cargo Arm.

 $M_a(a) = -20603 \, lbf \cdot in$

$$C_{1b} := (-1) \cdot M_{st} \cdot \frac{\cos\left(\frac{a}{j}\right)}{\tan\left(\frac{L_{st}}{j}\right)}$$

First term of Eq. A5.9, where x>a.

 $C_{1b} = -10020 \, lbf \cdot in$

$$C_{2b} := M_{st} \cdot cos \left(\frac{a}{j}\right)$$

Second term of Eq. A5.9, where x>a.

 $C_{2b}=15410\,lbf\cdot in$

$$M_b(x) := C_{1b} \cdot sin\!\!\left(\frac{x}{j}\right) + C_{2b} \cdot cos\!\!\left(\frac{x}{j}\right)$$

Equation A5.9 with terms C1 and C2 substituted. The term f(w) is ignored because no uniform load is applied.

Bending Moment in stanchion solved just above attachment of Cargo Arm.

 $M_b(a) = 26851bf \cdot in$

$$M_{max} := |M_a(a)|$$

Maximum Bending Stress occurs at "a", where Cargo Arm attaches to stanchion.

 $M_{\text{max}} = 20603 \, \text{lbf} \cdot \text{in}$

$$f_{b_st} := \frac{M_{max} \cdot \left(\frac{D_{stn}}{2}\right)}{I_{st}}$$

Bending Stress in stanchion due to Cargo Arm Loads.

 $f_{b_st} = 65.5 \, \text{ksi}$

Ultimate Tensile Strength of 2024-T3 tube (Mil-Hdbk-5H).

 $F_{tu_2024}=64\,\mathrm{ksi}$

D/t ratio for stanchion tube.

 $\frac{D_{stn}}{t_{stn}} = 17$

Ultimate Bending Modulus of 2024-T3 stanchion tube (Ref. Mil-Hdbk-5H, Figure 3.11.1.1.1).

F_b := 66.6·ksi

$$\text{MS} := \frac{F_b}{f_{b_st}} - 1$$

Ultimate Bending Margin of Safety of stanchion.

MS = 0.02

Bending moment applied by cargo arm to stanchion is reacted at the floor and ceiling attachments.

$R_{st} \coloneqq \frac{M_{st}}{L_{st}}$	Lateral Reaction Loads at top and bottom of stanchion are equal.	$R_{st} = 4591bf$
	Lateral and Longitudinal load allowable for ceiling hard- point (Ref. Bell Helicopter Report 205-099-205).	P _{lat} := 1250·1bf
$MS = \frac{P_{lat}}{R_{rt}} - 1$	Margin of Safety of stanchion attachment to ceiling hard-point for lateral reaction loads.	MS = 1.72

Vertical load applied by cargo arm to stanchion is reacted at the floor attachment hardpoint.

$$P_{\text{car_ult}} \begin{tabular}{ll} \hline P_{\text{car_ult}} \\ \hline \hline & Vertical \, Reaction \, Load \, at \, bottom \, of \, stanchion. \\ \hline & Vertical \, load \, allowable \, for \, floor \, hard-point \, \\ \hline & (Ref. \, Bell \, Helicopter \, Report \, 205-099-205). \\ \hline \hline & MS := \frac{P_{\text{ver}}}{Re} - 1 \\ \hline & Margin \, of \, Safety \, of \, stanchion \, attachment \, to \, floor \, \\ \hline & hard-point \, for \, vertical \, load. \\ \hline \hline \end{tabular} \begin{tabular}{ll} MS = 0.66 \\ \hline \end{tabular}$$

MARGIN OF SAFETY IS POSITIVE

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6.3 Structural Test

A structural test was conducted to simulate a limit and ultimate load onto the Cargo Deployment Arm and Stanchion Tube. This test was conducted to support the structural analysis findings of this document.

The test set-up applied loads at vertical and used the same aircraft roof fitting hardware to mount the tube assembly (see Figure 6.3.1 and Figure 6.3.2).

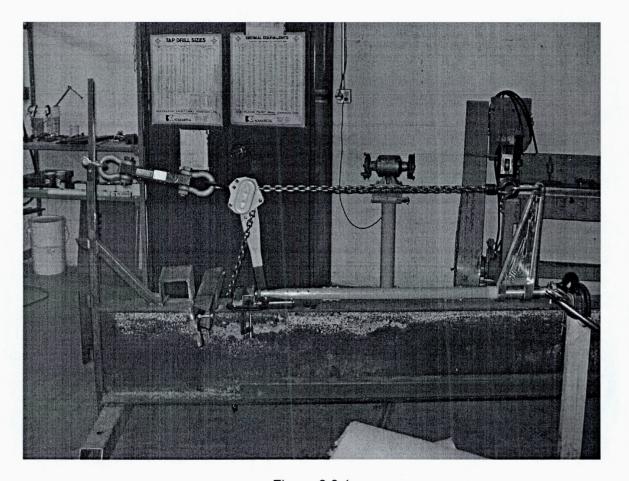


Figure 6.3.1

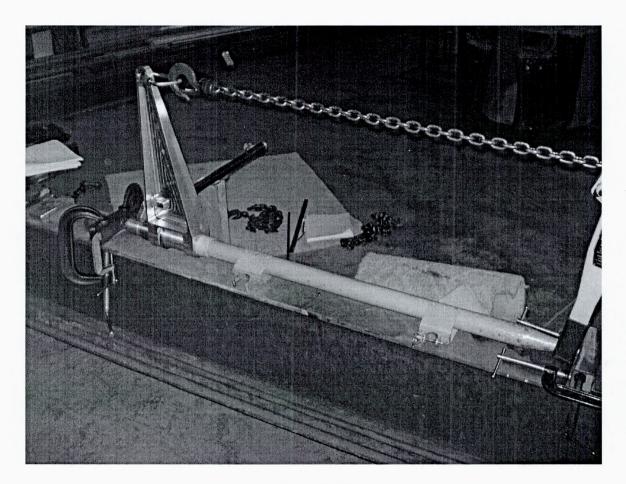


Figure 6.3.2

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The test loaded the tube assembly to above limit load (See Figure 6.3.3):

Limit load (250lbf x 3)= 750 lbf Test Limit Load = 790 lbf

The assembly showed no signs of permanent deformation.

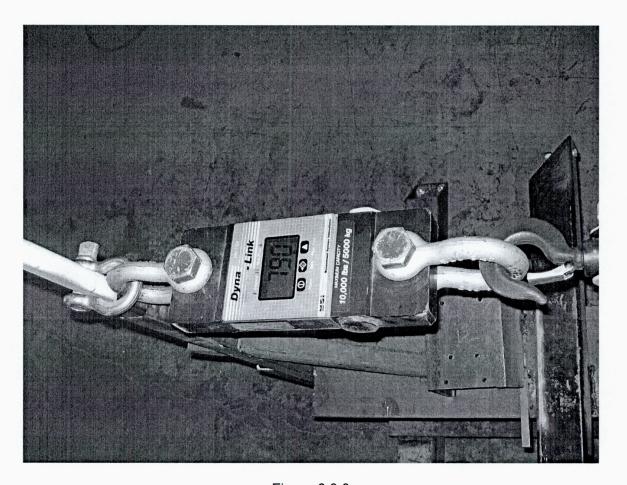


Figure 6.3.3

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The test loaded the tube assembly to above ultimate load (See Figure 6.3.4):

Ultimate load (250lbf x 3 x 1.5)= 1125 lbf Test Ultimate Load = 1140 lbf

The tube assembly showed no signs of permanent deformation.

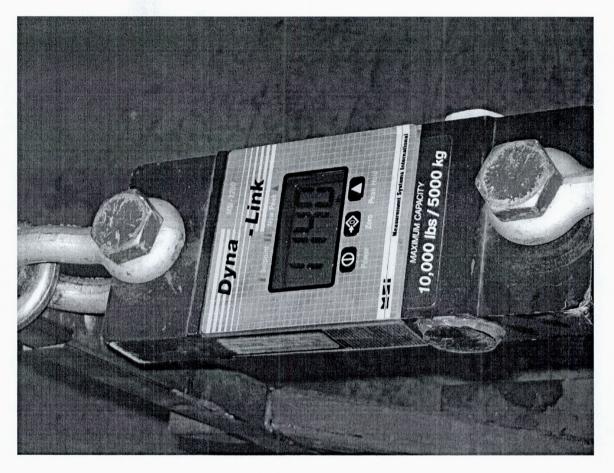


Figure 6.3.4

Results: This test supports the engineering finding in this report.

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7.0 STRUCTURAL ANALYSIS - RAPPEL STEP

7.1 Loads and Factors

There are two categories of load that can be applied to this step:

- 1) Aerodynamic Loads
- 2) Personnel Loads

There are no loads for this step specified by airworthiness regulations.

Aerodynamic Drag Load:

The forward mounting plate at stn 84.46 is the critical component for this analysis. This plate has the greatest frontal area and greatest distance between supports.

Drag Coefficent (plate) per Hoerner

$$C_d := 1.95$$

Air Density

$$\rho := 0.002376898 \cdot \frac{\text{slug}}{\text{ft}^3}$$

Aircraft "Never Exceed" Velocity

$$v_{ne} := 219.4 \cdot \frac{ft}{sec}$$

$$v_d := \frac{v_{ne}}{0.9}$$

Frontal Area of Mounting Plate 79821-01

$$A_{plate_stn84} \coloneqq 65.4 \cdot in^2$$

Force Applied to Mounting Plate 79821-01 as a result of aerodynamic drag at Vd.

$$F_d := 0.5 \cdot \rho \cdot v_d^2 \cdot A_{plate stn84} \cdot C_d$$

$$F_{cl} = 62.51bf$$

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This force is then applied to the mounting plate for beam bending analysis

Reaction At "A"

$$R_A := \frac{F_d \cdot 7.6 \cdot in}{20.77 \cdot in}$$

$$R_A = 22.91bf$$

Reaction At "C"

$$R_{C} := \frac{F_{d} \cdot 13.17 \cdot in}{20.77 \cdot in}$$

$$R_{\rm C} = 39.71 {\rm bf}$$

Max Bend Moment at "B"

$$\mathbf{M_B} := \mathsf{R_A} \!\cdot\! \mathsf{13.17} \!\cdot\! \mathsf{in}$$

$$M_{\rm B} = 301.4 \, {\rm in \cdot 1bf}$$

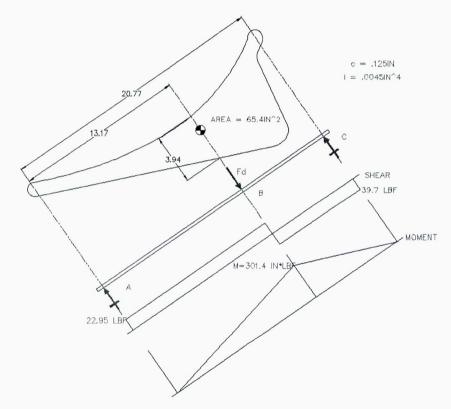


Figure 7.1.1

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Section Properties at "B":

Centroid $c_{\mathrm{B}} := 0.125 \cdot \mathrm{in}$

Moment of Inertia $I_{\text{p}} := 0.0045 \cdot \text{in}^4$

Stress:

$$\sigma_{\text{MB}} := \frac{M_{\text{B}} \cdot c_{\text{B}}}{I_{\text{D}}}$$

$$\sigma_{\text{MB}} = 8373 \, \text{psi}$$

Mechanical Properties 6061-T $F_{tu_6061} := 30 \cdot ksi$

Margin of Safety:

$$MS_{MB} := \frac{F_{tu}_{6061}}{G_{MB}} - 1$$
 $MS_{MB} = 2.6$

MARGIN OF SAFETY IS POSITIVE

Operational Loads

The Rappel Step is used in flight as a stabilizing structure for which suspended rappellers exiting the helicopter can steady and prepare themselves for the rappel. This operational mode is not likely to induce much load onto the Rappel Step since the rappeller is primarily supported by the rappel rope.

A more critical operational load case for the rappel step would be persons using the Rappel Step for entering or exiting the helicopter while on the ground. The following analysis shall determine that the step can support two (2) 95th percentile males, standing shoulder to shoulder, at 2Gs. The analysis will assume the load is normal to the stepping surface of the step.

The 2G load factor conservatively accounts for dynamic forces the persons induces by exiting or entering the helicopter.

Anthopometric Data - 95th Percentile Male

Weight

$$W_{95_M} := 216.3 \cdot 1bf$$

Shoulder Breadth (Ground Forces)

$$D_{sh_95_M} \coloneqq 19.6 \cdot in$$

Load factor for analysis

$$n_{lf_step} := 2$$

Load per Person on step

$$P_{step} := W_{95}M^{\cdot n}lf_{step}$$

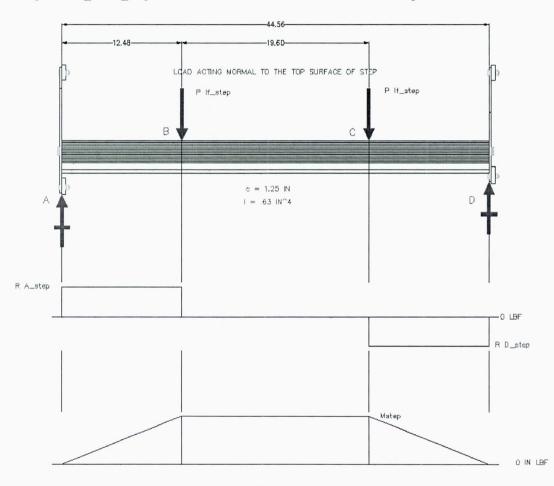


Figure 7.1.2

Reactions

$$R_{D_step} := \frac{P_{step} \cdot 12.48 \cdot in + P_{step} \cdot (D_{sh_95_M} + 12.48 \cdot in)}{44.56 \cdot in}$$

$$R_{D_step} = 432.61bf$$

$$R_{\mbox{A_step}} := \frac{P_{\mbox{step}} \cdot 12.48 \cdot \mbox{in} + P_{\mbox{step}} \cdot \left(D_{\mbox{sh_95_M}} + 12.48 \cdot \mbox{in} \right)}{44.56 \cdot \mbox{in}} \\ R_{\mbox{A_step}} = 432.61 \mbox{bf}$$

Bending Moment

$$M_{B-step} := R_{A-step} \cdot 12.48 \cdot in$$
 $M_{B-step} = 5398.8 \cdot in \cdot 1bf$

Mechanical Properties of the Step Extrusion

Centroid
$$c_{ ext{step}} \coloneqq 1.25 \cdot in$$

Moment of Inertia
$$I_{step} = 0.63 \cdot in^{-4}$$

Stress

$$\sigma_{\text{step}} := \frac{M_{\text{B_step}} \cdot c_{\text{step}}}{I_{\text{step}}}$$
 $\sigma_{\text{step}} = 10712 \, \text{psi}$

Margin of Safety:

$$MS_{step} := \frac{F_{tu_6061}}{\sigma_{step}} - 1$$
 $MS_{step} = 1.8$

MARGIN OF SAFETY IS POSITIVE

Shear Load on the AN4 bolts holding the step onto the plate is the same on both sides of the step. This analysis is also applied to the AN4 bolts attaching the plates to the helicopter hardpoints.

Mechanical Properties of AN4 Bolt (single shear) $F_{su_AN4} = 3680 \cdot lbf$

Margin of Safety:

$$MS_{step_AN4} := \frac{F_{su_AN4} \cdot 2}{R_{A step}} - 1$$

$$MS_{step_AN4} = 16$$

MARGIN OF SAFETY IS POSITIVE

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7.2 Rappel Step Compliance with FAR 29.251, Vibration

The Rappel Step Installation has been found to be in compliance with FAR 29.251. Refer to AERO Design Ltd. Flight Test Plan/Report TP757.02 for details.

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8.0 COMPLIANCE WITH 29.785(A), SEATS, BIRTHS, LITTERS, SAFETY BELTS, AND HARNESSES.

The installation of the Rappel Mount Provision and Cargo Deployment Arm has been evaluated for proximity to the helicopter occupant extremity strike envelope. This section evaluated the extremity strike envelope of the outboard-most occupants on the forward facing, five-position seat assembly (See Figure 8.0.1).

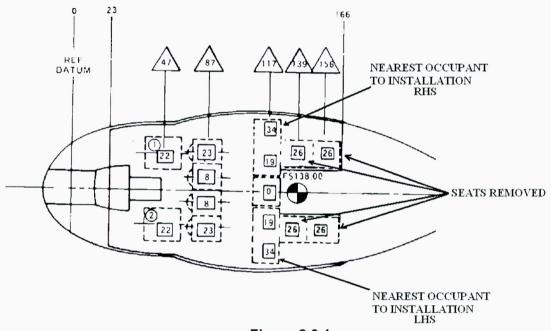


Figure 8.0.1

AC29-2C Para (AC29.785)(2)(ii) states:

- (2) The following criteria have been found satisfactory for preventing occupant head injuries:
- (ii) Elimination of injurious objects within striking distance of the head and other vital parts can be accomplished by removal of objects with sharp edges or rigid surfaces from within striking distance of vital parts of the occupant. Dimensions and weights for typical occupants are available in U.S. Army USAAULABS Reports 70-22 (August 1969) and 66-39 (June 1966) and NACA Report TN 2991 (August 1953). Because of the range of occupant head striking distance, a combination of "elimination of injurious objects" and "cushioned rests" may be required for some interior configurations.

The position of this document is that the installation of the Rappel Mount Provision and Cargo Deployment Arm do not add injurious objects within the strike envelope of the nearest occupant to the installation.

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Figures 8.0.2 and 8.0.3 show a ninety-fifth percentile male occupant's extremity strike envelopes restrained with the lap belt only. These strike envelopes are based on U.S. Army USAAVLABS TR 70-22.

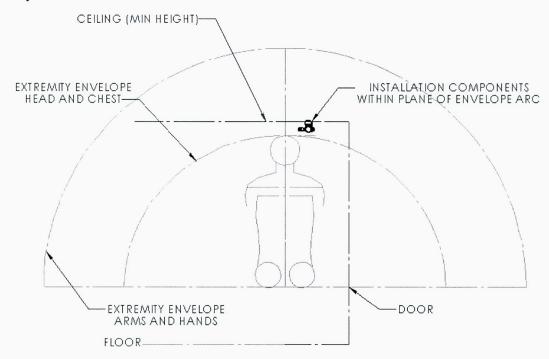


Figure 8.0.2

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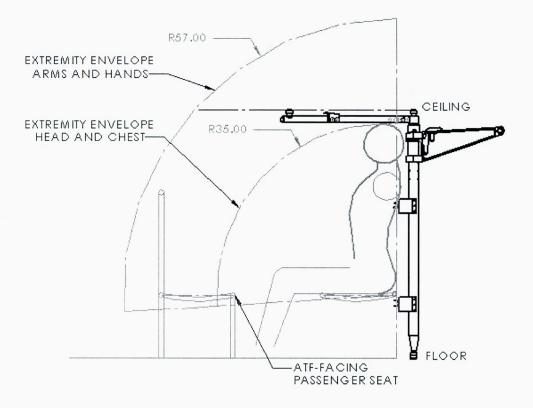


Figure 8.0.3

8.1 **Primary Hazards:**

The components of the Rappel Mount Provision and Cargo Deployment Arm Installation are outside of the seated and retrained occupant's head and chest strike envelope.

8.2 **Secondary Hazards:**

Compromising the occupant's ability to effect a rapid escape from the aircraft due trapping or injuring the lower extremities by this installation has been considered. The lower extremities of the occupant are not in the proximity of this installation and therefore unlikely to be injured or trapped by this installation.

8.3 **Tertiary Hazards:**

This installation is within the upper limb strike envelope of the nearest occupant. The rounded features of all of the installations components eliminate the likelihood of a piercing injury. The occupant may sustain a blunt force upper limb injury by striking the installation in the occurrence of an emergency landing.

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This injury occurrence potential is similar to the injury occurrence potential of the same occupant striking the aft facing passenger seat structure of the type certified design of the aircraft. In the case of a forward emergency landing condition, the aft facing seat structure is within the upper limb strike envelope of the occupant. The injury occurrence potential of the occupant striking the seat assembly and the rappel mount provision is similar in that the struck object is a rounded tube or fitting.

It should be noted that the aft facing seat assembly is also within the occupant's head and chest strike envelope. Furthermore, the off-set seating arrangement between the aft-facing and forward-facing seats exposes the forward facing occupants to the vertical structure members of the aft-facing seats.

By comparison, the installation of the Rappel Mount Provision and Cargo Deployment Arm provide no less tertiary hazards than the type certified design of the aircraft.

8.4 Upper Torso Vulnerability:

The components of the Rappel Mount Provision and Cargo Deployment Arm Installation are behind the left shoulder of the seated and retrained occupant. The strike envelope for upper torso movement has been considered and does not interface this installation.

9.0 COMPLIANCE WITH 29.785(E), SEATS, BIRTHS, LITTERS, SAFETY BELTS, AND HARNESSES.

The Rappel Mount Provision and Cargo Deployment Arm Installation position is at the outboard-most edge of the passenger seats and within close proximity to the crew door. Passengers moving about the cabin would not likely be within the proximity of this installation during normal flight.

APPENDIX A – AIRCRAFT AIRWORTHINESS DIRECTIVES

Directives Pertaining to Aircraft Model: BELL TEXTRON - USA, 212

New F	rod ype	Ctry.	AD Number		AD Subject	Service Bulletin or Reference	Repeat Insp.?
	Α	CF	<u>CF-98-15</u>	ם	EXTERNAL RESCUE SYSTEMS	CAR 702.21	NO
	Α	CF	CF-97-04	ם	FUEL LINE - CHANGE TO STAINLESS ELBOW FITTING	212-96-157	NO
	Α	CF	<u>CF-96-06</u>	ם	EMERGENCY ESCAPE PANELS		YES
	Α	CF	CF-95-20R1	ם	BOLTS OF FLIGHT CONTROL SERVO ACTUATORS	212-67-01	NO
	Α	CF	CF-94-07	ם	ZINC PRIMER AS OVERHEAT INDICATOR	212-93-89 REV A	REFER TO AD
	Α	CF	<u>CF-91-29R1</u>	D	AFT FACING SEAT HEADRESTS		REFER TO AD
	Α	CF	CF-91-27	ם	EMERGENCY ESCAPE RELEASE HANDLE COVERS		REFER TO AD
	Α	CF	CF-90-16R3	ם	MAIN ROTOR YOKE	212-90-60 REV A	REFER TO AD
	Α	CF	<u>CF-88-23R1</u>	ם	BLADE STRAP PINS	A8-27-45	REFER TO AD
	Α	EU	2006-0241	D 72	Replacement of Main Case P/N BC85-051 and piston BC85-052 with improved units made of stainless steel 6S80D.	CALEDONIAN AIRBORNE SYSTEMS SB CPT- 600/900/SB-01	REFER TO AD
	Α	US	2007-22-02	D 72	Tail rotor blade (blade) forward tip weight retention block (tip block) and the aft tip closure (tip closure)		REFER TO AD
	Α	US	2007-19-53	D 7	Missing Adhesive to the tip weight screws.	ASB 212-07-125	NO
	Α	US	2005-20-38	ם	To prevent rupture of an adapter, uncontrolled jetting of pressurized gas from the nitrogen bottle		REFER TO AD
	А	US	2003-01-04		204B, 205A /A-1/B, 212 - INSPECT MAIN ROTOR HUB	ASB 212-94-92 REV A	REFER TO AD
	Α	US	2002-22-14	D 7	204B, 205A/B, 212, 214B/B1 - MAIN ROTOR TT STRAPS		REFER TO AD

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A US 2001-13-01							
A US 2001-08-04 MAIN ROTOR ACTUATOR ASB 41105950-67A- REFER TO AD	Α	US	2002-19-05				
A US 98-11-15 A US 98-11-15 B TAIL ROTOR YOKE ASSY ASB 212-96-100/101 REFER TO AD A US 98-11-15 B TAIL ROTOR YOKE ASSY ASB 212-96-100/101 REFER TO AD A US 93-17-12 B MAIN ROTOR TRANSMISSION LOWER PLANETARY SPIDER A US 93-05-01 B POSSIBLE MAIN ROTOR YOKE FATIGUE FAILURE A US 92-23-01 B PREVENT SEPERATION MAIN 212-90-62 REV A REFER TO AD A US 92-13-10 B TAIL ROTOR DRIVESHAFT SUPERCEDES 91-24-REFER TO AD A US 92-09-05 B ENG DRIVESHAFT COUPLING 212-91-67 B ADAPTER A US 90-03-09 B TAIL ROTOR DRIVESHAFT COUPLING 212-91-67 B ADAPTER A US 90-03-09 B TAIL ROTOR DRIVESHAFT COUPLING 212-91-72 C REFER TO AD A US 90-03-09 C TAIL ROTOR DRIVESHAFT COUPLING 212-91-72 C REFER TO AD A US 90-03-09 C TAIL ROTOR DRIVESHAFT COUPLING 212-91-72 C REFER TO AD A US 90-03-09 C TAIL ROTOR DRIVESHAFT COUPLING 212-91-72 C REFER TO AD A US 90-03-09 C TAIL ROTOR DRAG BRACE 212-90-59 C REFER TO AD A US 90-03-09 C TAIL ROTOR DRAG BRACE 212-90-59 C REFER TO AD A US 89-08-05 C MAIN ROTOR DRAG BRACE 212-90-59 C REFER TO AD A US 89-08-05 C MAIN ROTOR DRAG BRACE 212-86-39 REV A REFER TO AD A US 89-08-05 C MAIN ROTOR TRUNNION BEARING 212-86-39 REV A REFER TO AD A US 86-17-09 C MAIN ROTOR TRUNNION 212-86-39RA C REFER TO AD A US 81-19-01 C MAIN ROTOR TRUNNION 212-86-39RA C REFER TO AD A US 81-19-01 C MAIN ROTOR TRUNNION 212-86-39RA C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C REFER TO AD A US 81-19-01 C MAIN ROTOR YOKE ASB 212-81-23 C MAIN ROTOR YOKE ASB 212-81-23 C MAIN ROTOR	Α	US	2001-13-01	ם		ASB 212-00-107RA	
A US 98-11-15 TAIL ROTOR YOKE ASSY ASB 212-96-100/101 REFER TO AD A US 94-18-09 MAIN TRANSMISSION LOWER PLANETARY SPIDER TO AD A US 93-17-12 MAIN ROTOR TRANSMISSION SUPERCEDES 92-11- REFER TO AD A US 93-05-01 POSSIBLE MAIN ROTOR YOKE FATIGUE FAITGUE F	Α	US	2001-08-04				
FAILURE. TO AD	Α	US	2000-15-52	D	MAIN ROTOR MAST/TRUNNION		
PLANETARY SPIDER	Α	US	98-11-15	D		ASB 212-96-100/101	
LOWER PLANETARY SPIDER 07 TO AD	Α	US	94-18-09	D		212-93-83	
A US 92-23-01 PREVENT SEPERATION MAIN 212-90-62 REV A REFER TO AD A US 92-13-10 TAIL ROTOR DRIVESHAFT SUPERCEDES 91-24- REFER TO AD A US 92-09-05 PILOW BLOCKS SUPERCEDES 91-24- REFER TO AD A US 92-07-08 SWASHPLATE SUPPORT ASSEMBLY SUPERCEDES 91-24- REFER TO AD A US 90-26-11 PASSEMBLY SUPPORT ASSEMBLY SUPPORT ASSEMBLY SUPPORT ASSEMBLY SUPPORT ASSEMBLY SUPPORT ASSEMBLY SUPPORT	Α	US	93-17-12	D			
A US 92-13-10 TAIL ROTOR DRIVESHAFT 16 SUPERCEDES 91-24- REFER TO AD A US 92-09-05 ENG DRIVESHAFT COUPLING 212-91-67 REFER TO AD A US 92-07-08 SWASHPLATE SUPPORT ASSEMBLY 212-91-72 REFER TO AD A US 90-26-11 MAIN ROTOR DRAG BRACE 212-90-59 REFER TO AD A US 90-03-09 T/R TRUNNION BEARING 12-86-39 REV A REFER TO AD A US 89-08-05 MAIN TRANSMISSION - SPIRAL BEVEL GEARS TO AD A US 86-17-09 TAIL ROTOR TRUNNION 212-86-39RA REFER TO AD A US 81-19-01 MAIN ROTOR YOKE ASB 212-81-23 REFER TO AD	Α	US	93-05-01	ם			
A US 92-09-05 ENG DRIVESHAFT COUPLING 212-91-67 REFER TO AD A US 92-07-08 SWASHPLATE SUPPORT ASSEMBLY 212-91-72 REFER TO AD A US 90-26-11 MAIN ROTOR DRAG BRACE 212-90-59 REFER ASSEMBLY TO AD A US 90-03-09 T/R TRUNNION BEARING ASSEMBLY 212-86-39 REV A REFER TO AD A US 89-08-05 MAIN TRANSMISSION - SPIRAL BEVEL GEARS TO AD A US 86-17-09 TAIL ROTOR TRUNNION 212-86-39RA REFER TO AD A US 81-19-01 MAIN ROTOR YOKE ASB 212-81-23 REFER TO AD	Α	US	92-23-01			212-90-62 REV A	
ADAPTER ADAPTER TO AD A US 92-07-08 SWASHPLATE SUPPORT ASSEMBLY BEFER TO AD A US 89-08-05 BEVEL GEARS ASSEMBLY ASSEMBLY BEFER TO AD A US 86-17-09 BEARING HOUSING ASSEMBLY ASSEMBLY BEFER TO AD AND ASSEMBLY BEFER TO AD BEARING HOUSING ASSEMBLY BEFER TO AD ASSEMBLY BEFER TO AD ASSEMBLY BEFER TO AD BEARING HOUSING BEFER TO AD	Α	US	92-13-10	D			
A US 90-26-11 MAIN ROTOR DRAG BRACE 212-90-59 REFER TO AD A US 90-03-09 T / R TRUNNION BEARING HOUSING ASSEMBLY A US 89-08-05 MAIN TRANSMISSION - SPIRAL BEVEL GEARS A US 86-17-09 TAIL ROTOR TRUNNION 212-86-39RA REFER TO AD A US 81-19-01 MAIN ROTOR YOKE ASB 212-81-23 REFER TO AD	Α	US	92-09-05	D		212-91-67	
ASSEMBLY TO AD A US 90-03-09 T / R TRUNNION BEARING 212-86-39 REV A REFER TO AD A US 89-08-05 MAIN TRANSMISSION - SPIRAL BEVEL GEARS TO AD A US 86-17-09 TAIL ROTOR TRUNNION BEARING 212-86-39 REV A REFER TO AD A US 81-19-01 MAIN ROTOR YOKE ASB 212-81-23 REFER TO AD	Α	US	92-07-08	ם		212-91-72	
HOUSING ASSEMBLY A US 89-08-05 MAIN TRANSMISSION - SPIRAL BEVEL GEARS TO AD TAIL ROTOR TRUNNION BEARING HOUSING A US 81-19-01 MAIN ROTOR YOKE ASB 212-81-23 REFER TO AD	Α	US	90-26-11	D		212-90-59	
A US 86-17-09 TAIL ROTOR TRUNNION 212-86-39RA REFER TO AD A US 81-19-01 MAIN ROTOR YOKE ASB 212-81-23 REFER TO AD	Α	US	90-03-09	ם		212-86-39 REV A	
A US 81-19-01 MAIN ROTOR YOKE ASB 212-81-23 REFER TO AD	Α	US	89-08-05				
TO AD	Α	US	86-17-09	D		212-86-39RA	
A US <u>81-10-07</u> SWASHPLATE SUPPORT ASB 212-81-22 REFER	Α	US	81-19-01	ם	MAIN ROTOR YOKE	ASB 212-81-23	
	Α	US	81-10-07		SWASHPLATE SUPPORT	ASB 212-81-22	REFER

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			ם		TO AD
Α	US	80-21-05		LANDING GEAR CROSS TUBES	REFER TO AD
Α	US	<u>79-20-05</u>	D	MAIN ROTOR HUB ASSEMBLY	REFER TO AD
Α	US	79-05-08	D	EMER FLOTATION (DITCHING) EQUIPMENT	REFER TO AD
Α	US	78-21-02	D	EXTERNAL LOAD LINK ASSEMBLY	REFER TO AD
Α	US	78-20-07		SHOULDER RADIUS FITTING	REFER TO AD
Α	US	<u>78-17-03</u>	ם	SPIRAL BEVEL GEAR	REFER TO AD
A	US	78-14-07		SKID LANDING GEAR	REFER TO AD
Α	US	78-09-02	ם	EMERGENCY FLOAT KITS	REFER TO AD
Α	US	<u>77-17-05</u>	ם	EMERGENCY EXIT LATCH PIN	REFER TO AD
Α	US	77-17-03	ם	TAIL ROTOR BLADE PITCH HORN	REFER TO AD
Α	US	77-10-05		CRACKS IN MAIN ROTOR BLADES SKIN	REFER TO AD
Α	US	77-05-02	ם	MAIN ROTOR BLADES	REFER TO AD
Α	US	76-14-03	D	CROSS TUBE ASSEMBLIES	REFER TO AD
Α	US	<u>76-02-06</u>	ם	MAIN ROTOR BLADES	REFER TO AD
Α	US	<u>75-26-05</u>	D	MAIN ROTOR BLADES	REFER TO AD
Α	US	<u>75-26-03</u>	ם	EMERGENCY EXIT HANDLE	REFER TO AD
Α	US	<u>75-07-01</u>	ם	HIGH FREQUENCY VIBRATION	REFER TO AD

Α	US <u>74-20-05</u>	ם	ELEVATOR MODIFICATION	REFER TO AD
Α	US <u>74-02-01</u>	D	TAIL ROTOR TRUNNION BEARINGS	REFER TO AD

Directives Pertaining to Aircraft Model: BELL TEXTRON - USA, 205A 1

			Ū				
New F	Prod Type	Ctry.	AD Number		AD Subject	Service Bulletin or Reference	Repeat Insp.?
	Α	CF	CF-98-15	ם	EXTERNAL RESCUE SYSTEMS	CAR 702.21	NO
	Α	CF	CF-96-06	ם	EMERGENCY ESCAPE PANELS		YES
	Α	CF	CF-95-20R1		BOLTS OF FLIGHT CONTROL SERVO ACTUATORS	205-67-01	NO
	Α	CF	CF-94-07		ZINC PRIMER AS OVERHEAT INDICATOR	205-93-58 REV A	REFER TO AD
	Α	CF	CF-91-29R1	ם	AFT FACING SEAT HEADRESTS		REFER TO AD
	Α	CF	CF-91-27		EMERGENCY ESCAPE RELEASE HANDLE COVERS		REFER TO AD
	Α	CF	<u>CF-90-16R3</u>	۵	MAIN ROTOR YOKE	205-90-36 REV A	REFER TO AD
	Α	CF	CF-88-23R1		BLADE STRAP PINS	A8-27-45	REFER TO AD
	Α	CF	<u>CF-77-03</u>		205A - ALIGNMENT BETWEEN ENGINE AND TRANSMISSION	205769	YES
	Α	US	2007-22-02	DE	Tail rotor blade (blade) forward tip weight retention block (tip block) and the aft tip closure (tip closure)	205-00-80	REFER TO AD
	Α	US	2007-19-53		Missing Adhesive to the tip weight screws.	ASB 205-07-95	NO
	Α	US	2003-01-04		204B, 205A /A-1/B, 212 - INSPECT MAIN ROTOR HUB	ASB 212-94-92 REV A	REFER TO AD

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Α	US	2002-22-14		204B, 205A/B, 212, 214B/B1 - MAIN ROTOR TT STRAPS		REFER TO AD
Α	US	2002-09-51	D	TAIL ROTOR GRIPS		REFER TO AD
Α	US	2001-13-01	D	TAIL ROTOR COUNTERWEIGHT BELLCRANK RETENTION NUT	ASB 205-00-77RA	REFER TO AD
Α	US	2001-08-04	D	MAIN ROTOR ACTUATOR LOCKING WASHER	ASB 41105950- 67A-01	REFER TO AD
Α	US	2000-15-52		MAIN ROTOR MAST/TRUNNION		REFER TO AD
						TOAD
Α	US	99-18-02		VERTICAL FIN SPAR CAP	ASB 205-98-70	REFER TO AD
Α	US	99-17-03	۵	FAILURE OF TAILBOOM VERTICAL FIN SPAR	ASB 205-98-71 REV A	REFER TO AD
Α	US	98-11-14		TAIL ROTOR YOKE ASSY FAILURE	ASB205-96-68/69	REFER TO AD
Α	US	94-18-09	D	MAIN TRANSMISSION LOWER PLANETARY SPIDER	205-93-54	REFER TO AD
Α	US	93-17-12	D	MAIN ROTOR TRANSMISSION LOWER PLANETARY SPIDER	SUPERCEDES 92- 11-07	REFER TO AD
Α	US	92-27-21	ם	TAIL ROTOR DRIVE SHAFT	205-92-49	REFER TO AD
Α	US	92-23-01	D	PREVENT SEPERATION MAIN ROTOR PILLOW BLOCKS	205-90-38 REV A	REFER TO AD
Α	US	92-13-10	D	TAIL ROTOR DRIVESHAFT HANGER BEARINGS	SUPERCEDES 91- 24-16	REFER TO AD
Α	US	92-07-08	D	SWASHPLATE SUPPORT ASSEMBLY	205-91-45	REFER TO AD
Α	US	86-17-10	ם	TAIL ROTOR TRUNNION BEARING HOUSING	205-86-24RA	REFER TO AD
Α	US	81-19-02	ם	MAIN ROTOR YOKE	ASB 204-81-11	REFER TO AD
Α	US	80-21-05	ם	LANDING GEAR CROSS TUBES		REFER TO AD
Α	US	79-20-05	۵	MAIN ROTOR HUB ASSEMBLY		REFER TO AD

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Α	US	78-21-02	ם	EXTERNAL LOAD LINK ASSEMBLY	REFER TO AD
Α	US	78-20-07	D	SHOULDER RADIUS FITTING	REFER TO AD
Α	US	<u>78-14-07</u>	۵	SKID LANDING GEAR	REFER TO AD
Α	US	<u>77-17-05</u>		EMERGENCY EXIT LATCH PIN	REFER TO AD
Α	US	77-17-03	ם	TAIL ROTOR BLADE PITCH HORN	REFER TO AD
Α	US	77-10-07	D	ENGINE-TO-TRANSMISSION ASSY	REFER TO AD
Α	US	<u>76-14-03</u>	ם	CROSS TUBE ASSEMBLIES	REFER TO AD
Α	US	76-12-07	ם	TAIL ROTOR CHAINS	YES
Α	US	<u>76-10-01</u>	۵	TAIL BOOM	REFER TO AD
Α	US	76-06-02		FIRE EXTINGUISHER CIRCUIT	REFER TO AD
Α	US	76-02-06	ם	MAIN ROTOR BLADES	REFER TO AD
Α	US	<u>75-26-05</u>		MAIN ROTOR BLADES	REFER TO AD
Α	US	75-26-03	D	EMERGENCY EXIT HANDLE	REFER TO AD
Α	US	74-23-02		TAIL ROTOR PITCH	REFER TO AD
Α	US	74-02-01	ם	TAIL ROTOR TRUNNION BEARINGS	REFER TO AD
Α	US	73-17-04		TAIL ROTOR GRIPS	REFER TO AD
Α	US	73-16-03	ם	LANDING GEAR CROSS TUBES	REFER TO AD
Α	US	71-21-02		TAIL FIN AND BOOM	REFER

				TO AD
Α	US <u>70-06-02</u>	ם	TAIL ROTOR GRIP ASSY	REFER TO AD
Α	US <u>69-15-07</u>	n	FLOAT KIT TUBE	REFER TO AD

All airworthiness directives applicable to: Manufacturer: BELL TEXTRON - USA Model: 205B

AD Record List

Nev	<u>Model</u>	Ctry	AD Number		AD Subject	Service Bulletin or Reference	Repeat Insp.?
	205B	CF	<u>CF-88-</u> <u>23R1</u>	ם	BLADE STRAP PINS	A8-27-45	REFER TO AD
	205B	CF	<u>CF-98-15</u>	ם	EXTERNAL RESCUE SYSTEMS	CAR 702.21	NO
	205B	US	2007-22-02		Tail rotor blade (blade) forward tip weight retention block (tip block) and the aft tip closure (tip closure)	205B-00-34	REFER TO AD
	205B	US	2007-19-53	口宽	Missing Adhesive to the tip weight screws.	ASB 205B-07-46	NO
	205B	US	2003-01-04	ם	204B, 205A /A-1/B, 212 - INSPECT MAIN ROTOR HUB	ASB 212-94-92 REV A	REFER TO AD
	205B	US	2002-22-14	口咒	204B, 205A/B, 212, 214B/B1 - MAIN ROTOR TT STRAPS		REFER TO AD
	205B	US	2002-09-51	ם	TAIL ROTOR GRIPS		REFER TO AD
	205B	US	2001-13-01	D	TAIL ROTOR COUNTERWEIGHT BELLCRANK RETENTION NUT	ASB 205B-00-31RA	REFER TO AD
	205B	US	2001-08-04	ם	MAIN ROTOR ACTUATOR LOCKING WASHER	ASB 41105950-67A-01	REFER TO AD
	205B	US	2000-15-52		MAIN ROTOR MAST/TRUNNION		REFER TO AD

205B	US <u>99-18-02</u>	ם	VERTICAL FIN SPAR CAP	ASB 205-98-70	REFER TO AD
205B	US <u>98-11-14</u>		TAIL ROTOR YOKE ASSY FAILURE	ASB205-96-68/69	REFER TO AD
205B	US <u>94-18-09</u>	ם	MAIN TRANSMISSION LOWER PLANETARY SPIDER	412-93-72 REV A	REFER TO AD
205B	US <u>93-17-12</u>		MAIN ROTOR TRANSMISSION LOWER PLANETARY SPIDER	SUPERCEDES 92-11-07	REFER TO AD
205B	US <u>92-23-01</u>	ם	PREVENT SEPERATION MAIN ROTOR PILLOW BLOCKS	212-90-62 REV A	REFER TO AD
205B	US <u>92-13-10</u>	D	TAIL ROTOR DRIVESHAFT HANGER BEARINGS	SUPERCEDES 91-24-16	REFER TO AD
205B	US <u>92-27-21</u>	ם	TAIL ROTOR DRIVE SHAFT	205-92-49	REFER TO AD
205B	US <u>92-07-08</u>		SWASHPLATE SUPPORT ASSEMBLY	204-91-32	REFER TO AD
205B	US <u>81-19-02</u>	ם	MAIN ROTOR YOKE	ASB 205-81-16	REFER TO AD

All airworthiness directives applicable to:

Manufacturer: BELL TEXTRON - CAN

Model: 412

AD Record List

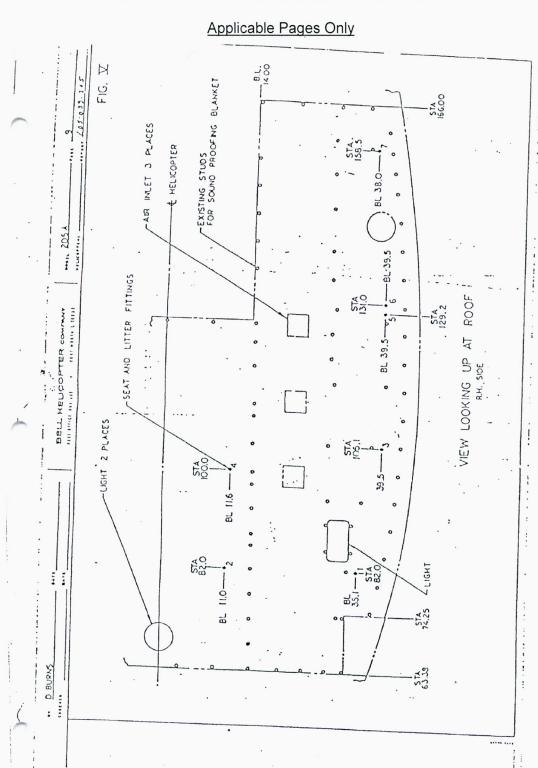
New <u>Model</u>	Ctry. AD Number	AD Subject	Service Bulletin or Reference	Repeat Insp.?
412	CF <u>CF-94-07</u>	ZINC PRIMER AS OVERHEAT INDICATOR	412-93-79 REV A	REFER TO AD
412	CF <u>CF-95-20R1</u>	BOLTS OF FLIGHT CONTROL SERVO ACTUATORS	212-67-01	NO
412	CF <u>CF-98-15</u>	EXTERNAL RESCUE SYSTEMS	CAR 702.21	NO

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412	US <u>2007-22-02</u>	Tail rotor blade (blade) forward tip 412-00-106, AND weight retention block (tip block) 412CR-00-13, and the aft tip closure (tip closure) REVISION A	REFER TO AD
412	US <u>2007-19-53</u>	Missing Adhesive to the tip weight ASB 412-07-123 Screws.	NO
412	US <u>2001-22-14</u>	FIRE EXTINGUISHING SYSTEM OAS SB 22-09-97 BOTTLE CARTRIDGES INSTALLED TO WALTER KIDDE FIREX BOTTLES	REFER TO AD
412	US <u>2001-13-01</u>	TAIL ROTOR COUNTERWEIGHT ASB 412-00-102RA BELLCRANK RETENTION NUT	REFER TO AD
412	US <u>2001-09-11</u>	TAIL ROTOR YOKE FATIGUE ASB412-96-89 FAILURE	REFER TO AD
412	US <u>2001-08-04</u>	MAIN ROTOR ACTUATOR ASB 41105950- LOCKING WASHER 67A-01	REFER TO AD
412	US <u>2000-18-09</u>	TAILBOOM ATTACHMENT 412-00-100 UPPER LH CAP ANGLE	REFER TO AD
412	US <u>99-23-23</u>	MAIN ROTOR YOKE 412-98-93	REFER TO AD
412	US <u>97-11-04</u>	MAST AND SPLINE PLATE ASB 412-94-81 REV B	REFER TO AD
412	US <u>97-07-06</u>	SWASHPLATE SUPPORT ASSY ASB 412-92-57/61	REFER TO AD
412	US <u>94-18-09</u>	MAIN TRANSMISSION LOWER 412-93-72 REV A PLANETARY SPIDER	REFER TO AD
412	US <u>93-17-12</u>	MAIN ROTOR TRANSMISSION SUPERCEDES 92- LOWER PLANETARY SPIDER 11-07	REFER TO AD
412	US <u>93-02-07</u>	VERTICAL FIN SPAR 412-92-65	REFER TO AD
412	US <u>92-13-10</u>	TAIL ROTOR DRIVESHAFT HANGER BEARINGS SUPERCEDES 91- 24-16	REFER TO AD
412	US <u>92-09-05</u>	ENG DRIVESHAFT COUPLING 412-91-53 ADAPTER	REFER TO AD
412	US <u>82-26-51R1</u>	YOKE ASSEMBLIES SERVICE ASB 412-82-9 TIME	REFER TO AD
412	US <u>90-03-09</u>	T / R TRUNNION BEARING 412-86-25 REV A HOUSING ASSEMBLY	REFER TO AD
412	US <u>89-08-05</u>	MAIN TRANSMISSION - SPIRAL BEVEL GEARS	REFER TO AD

412	US <u>86-16-11</u>	ם	TAIL ROTOR TRUNNION BEARING HOUSING	412-86-25RA	REFER TO AD
412	US <u>85-07-01</u>	ם	MAIN ROTOR PITCH HORN	ASB 412-83-12 REV A	REFER TO AD

APPENDIX B - BELL HELICOPTERS RPT 205-099-205



BELL HEUCOPTER COMMENT 205A 11 212,2146 11 205.099-205

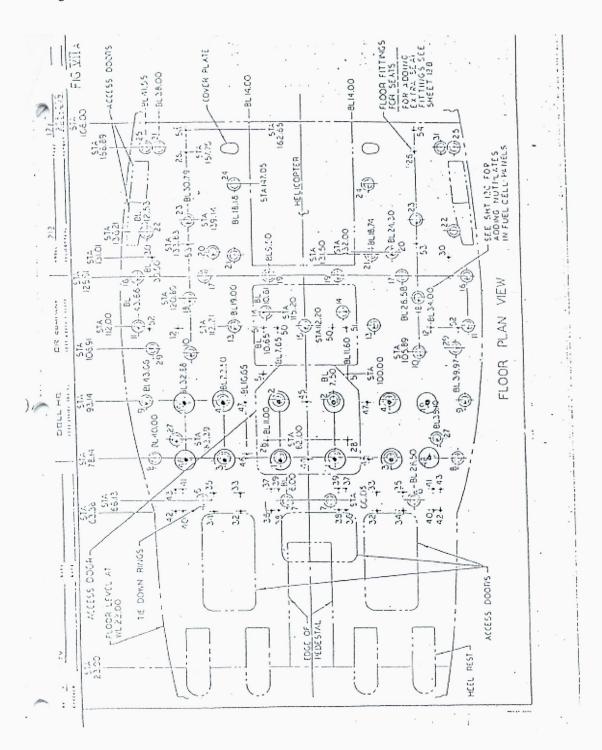
ROOF FITTINGS

POINT	LOAD CAPACITY (LBS ULT)					
	UP	DN	LONG.	LAT.		
1		1500	370	1130	*	
2	-	1500	1250	1250	Δ	
7		1500	10 = -			
5			1250	1250	Δ	
6			1250	1250	Δ	
7		1500	1250	1250	Δ	
		1000				

- * DO NOT COMBINE LONG. AND LAT. LOADS WITH 1500 LB DN LOAD. THE 1130 LB LOAD MAY BE APPLIED IN ANY DIRECTION IN THE LATERAL VERTICAL PLANE.
- APPLY THE LOAD IN ANY DIRECTION IN THE HORIZONTAL PLANE AS LONG AS THE NET LOAD RESULTANT DOES NOT EXCEED 1250 LBS.

22 43425

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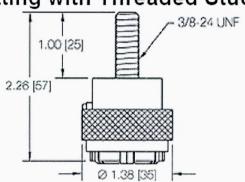


DY TO UNITED BELL HEUCOPTER COMPANY MODELCUMY, CIC PAGE 1.) _npt 205-C99-205 CHACKED .. FLOOR FITTINGS A THIOS LOAD CAPACITY (LBS ULT) UP | DN ILCNG. LAT. 2500 :2500 : 1700 : 1700 11250 1250 0 Oi 0 11 12 C 125. 1250 2150 1250 2150 1250 1250 2150 1250 1250 0 1250 2150 1250 1250 20 21 2150 : 2150 : 1250 : 1250 : 1250 : 1250 0 | 2150 | 2150 _| | 1250 | 1250 | AT EACH POINT ANY SINGLE VERTICAL AND SINGLE HORIZONTAL LOAD MAY BE APPLIED SIMULTANEOUSLY OAT STUD ONLY, 2500 LBS MAY BE APPLIED VERTICALLY. UP OR DOWN OR WITHIN A 30° CONE FROM THE VERTICAL. 2150 LBS, UP OR ECWN, AND 1250 LBS HORIZONTAL LOAD HAVE A RESULTANT OF 2500 LBS AT AN 'ANGLE OF 30' E FROM THE VERTICAL. THIS IS MAX ANGLE FOR APPLYING 2500 LBS.

APPENDIX C - 33115 ROOF ATTACHING HARDWARE SPECIFICATIONS

12 Jaw Fitting with Threaded Stud 33115





12 Jaw Fitting with Threaded Stud

0° Vertical Breaking Strength: 5,475 lbs./2485 kgs. 90° Pull Angle Breaking Strength: 2,300 lbs./1045 kgs.

Weight: 0.22 lbs./ 0.10 kgs.

Revision 0

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FMS758.90

2013 - 39th Avenue NE Calgary, Alberta, T2E 6R7

BELL 212, 412, 205A-1, 205B

ROTORCRAFT FLIGHT MANUAL SUPPLEMENT

for the

INSTALLATION of RAPPEL MOUNT PROVISION

Limited Supplemental Type Certificate No. C-LSH08-157/D

Sections 1, 2, 3 and 4 of this document comprise the Transport Canada Approved sections of this Flight Manual Supplement. Compliance with Section 1, Limitations, is mandatory.

Section 5 and any subsequent sections if present are Unapproved and are provided for information only.

The information and data contained in this Flight Manual Supplement supersede or supplement that contained in the basic Approved Flight Manual for the 212 and 205A-1 when fitted with the Rappel Mount Provision. For limitations, procedures and performance not listed in this Flight Manual Supplement, refer to the Approved Flight Manual and other approved Flight Manual Supplements.

Transports

Canada

AIRCRAFT CERTIFICATION DIVISION

Transport

Transpor Canada

Approval Date 2008-05-07 YY - MM - DD

Revision 1 07 April 2008 TRANSPORT CANADA APPROVED

AERO DESIGN LTD.

FMS758.90

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2	Normal Procedures	6
3	Emergency Procedures	8
4	Performance	8
5	Weight and Balance	9

Revision 1 07 April 2008 Page 2 of 9 TRANSPORT CANADA APPROVED

1 LIMITATIONS

1-3 TYPES OF OPERATIONS:

The Rappel Mount Provision is an approved provision for rappel operations only.

Rappel operations permitted during VFR conditions only.

1-4 FLIGHT CREW:

Rappel Operations:

A second crewman is required as a Rappel Operations Load Master if rappel operations are to be conducted. The crewman must have full access of the cabin to perform duties as a Rappel Operations Load Master.

Rappellers may be present as passengers essential to the operation. The Rappellers must have full access of the passenger area within the cabin to perform duties as a Rappel Crew Member.

All Rappel Crew Members are to be directed by the Rappel Operations Load Master.

The Rappel Operations Load Master and all Rappel Crew Members must wear a protective helmet for moving about in the aircraft.

Carriage of Passengers during non-rappel flights:

All passengers must remain seated with the seatbelt fastened during flight.

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TRANSPORT CANADA APPROVED

1-5 CONFIGURATION:

The aircraft may be equipped with:

A Left Hand Rappel Mount Provision,

A Right Hand Rappel Mount Provision, or

Both Left Hand and Right Hand Rappel Mount Provisions.

1-5-A REQUIRED EQUIPMENT FOR RAPPEL OPERATIONS:

The aircraft must have a functioning communications system betweent the pilot and the load master.

A hook knife must be;

- Carried by the Rappel Operations Load Master for immediate access, or
- Fixed within the helicopter interior, readily accessible to the Rappel Operations Load Master, as detail by the operating agency's operating procedures.

1-7 AIRSPEED

Rappel Operations: Hover with lateral translation at a speed not to exceed 10 knots is permitted for positioning only.

Revision 1 07 April 2008

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TRANSPORT CANADA APPROVED

AERO DESIGN LTD.

FMS758.90

1-20 MARKINGS AND PLACARDS

Placards 75801-11 and 75801-12 to be in clear view of the pilot

AIRCRAFT MUST BE IN HOVER FOR RAPPEL OPERATIONS

Placard 75801-11

RAPPEL OPERATIONS DURING VFR CONDITIONS ONLY

Placard 75801-12

Placard 75801-13 to be attached to Rappel Mount Provision in clear view of the load master.

MAXIMUM RAPPEL MOUNT CAPACITY 350 LBS (158 KG)

Placard 75801-13

Revision 1 07 April 2008 Page 5 of 9 TRANSPORT CANADA APPROVED

2 NORMAL PROCEDURES

2-1 INTRODUCTION:

The Rappel Mount Provision is approved for rappel operations only. A rappel operation is the continuous controlled decent of a single person (the rappeller) from the aircraft to the ground. The rappeller descends on a rope fixed to the Rappel Mount Provision and controls the decent.

This section contains instructions for conducting rappel operations.



INTENTIONALLY STOPPING THE DECENT PRIOR TO REACHING THE GROUND IS NOT PERMITTED



USING THE RAPPEL MOUNT PROVISION FOR EXTRACTIONS IS NOT PERMITTED.

2-3 PREFLIGHT CHECK:

Visually inspect the Rappel Mount Provision for loose fasteners and wear.

Ensure the roof and floor fittings are properly in position and locked.

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TRANSPORT CANADA APPROVED

2-9 IN FLIGHT OPERATIONS - RAPPEL OPERATIONS:

Ensure communication between the pilot and the load master is established and maintained.



STOP RAPPEL OPERATIONS IF COMMUNICATION BETWEEN THE PILOT AND THE LOAD MASTER HAS FAILED

Rappel operations may commence only on the pilot's command

Rappel operations must stop on the pilot's command.

The aircraft must be in hover flight during rappel operations

The aircraft must maintain an altitude that ensures the rappel line is in contact with the ground.

The rappel rope must be dropped to the ground when the rappel operation is complete. Do not retract the rappel line into the aircraft.

The load master must observe the rappel operation and communicate to the pilot the status of the rappel operation continuously.

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TRANSPORT CANADA APPROVED

3 EMERGENCY PROCEDURES

Suspension line jettisonability lies within the direct control of the load master under the pilots command. Clear communication between the pilot and the load master must be maintained during rappel operations.

SUSPENSION LINE JETTISON PROCEDURE

On the command of the pilot the load master must jettison the suspension line by:

- i. Releasing the suspension line, or
- ii. Cutting the line with the hook knife provided for the Rappel Operations Load Master.



THE SUSPENSION LINE MUST BE CUT AS SHORT AS PRACTICAL.

ANY LOOSE LINE REMAINING MUST BE IMMEDIATELY SECURED TO PREVENT ANY POSSIBLE ENTANGLEMENT WITH THE HELICOPTER ROTOR SYSTEM.

4 PERFORMANCE

No change from basic Rotorcraft Flight Manual.

Revision 1 07 April 2008

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TRANSPORT CANADA APPROVED

AERO DESIGN LTD.

FMS758.90

5 WEIGHT AND BALANCE

English Units		Long	itudinal	Lateral		
Item	Weight	Arm	Moment	Arm	Moment	
item	(Lb)	(in)	(in*Lb)	(in)	(in*Lb)	
Left Hand Rappel Mount Provision (If Installed)	7.63	120.4	918.6	-39.5	-301.4	
Right Hand Rappel Mount Provision	7.63	120.4	918.6	39.5	301.4	
(If Installed)						

Metric Units		Long	itudinal	Lateral		
Item	Weight	Arm	Moment	Arm	Moment	
item	(kg)	(m)	(kg*m)	(m)	(kg*m)	
Left Hand Rappel Mount Provision 3.5 (If Installed)		3.06	10.71	-1.00	-3.5	
Right Hand Rappel Mount Provision (If Installed)	3.5	3.06	10.71	1.00	3.5	

Note:

A rappeller suspended from the Rappel Mount Provision is located at Fuselage Station 113in and Right Butt Line 50in (for Right Hand Rappel Mount Provision) and/or Left Butt Line -50in (for Left Hand Rappel Mount Provision).

Revision 1 07 April 2008

Page 9 of 9 UNAPPROVED SECTION





Department of Transport

Limited Supplemental Type Certificate

This approval is issued to:

Number: C-LSH08-157/D

AERO Design Ltd.

Issue No.:

2013 39th Avenue NE

Approval Date: 30 April 2008

Calgary, Alberta

Issue Date: 30 April 2008

Canada T2E 6R7

Responsible Office:

Prairie and Northern

Aircraft/Engine Type or Model:

BELL 212

Registration/Serial No.:

C-GALI/30525, C-FAHZ/30562, C-FAHL/30588, C-GIRZ/30622, C-GAHV/30699, C-FAHR/30789, C-FAHB/30794, C-FALV/30816, C-FAHK/30852, C-FAHP/30933, C-GAHO/30937, C-FAHG/30940,

C-FALK/30982, C-GRNR/30999, C-FAHC/31246

Canadian Type Certificate or Equivalent:

Description of Type Design Change:

Rappel Mount Provision and Cargo Deployment Arm

Installation/Operating Data,

Required Equipment and Limitations :

Configuration A - Rappel Mount Provision Only:

Installation of the Rappel Mount Provision to be completed in accordance with Transport Canada approved, AERO Design Ltd. Document Control List, DCL758-1, Revision 0, dated 30 April 2008, or later approved revision.

Transport Canada approved, AERO Design Ltd. Flight Manual Supplement FMS758.90, Revision 0, dated 07 April, 2008, or later approved revision is required with this installation.

Configuration B - Rappel Mount Provision with Cargo Deployment Arm:

Installation of the Rappel Mount Provision and Cargo Deployment Arm to be completed in accordance with Transport Canada approved, AERO Design Ltd. Document Control List, DCL758-1, Revision 0, dated 30 April 2008, and Transport Canada approved, AERO Design Ltd. Document Control List, DCL792-1, Revision 0, dated 30 April 2008, or later approved revisions.



Conditions: This approval is only applicable to the type/model of aeronautical product specified therein. Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated will not adversely affect the airworthiness of the modified product.

> E. Burgoin, DAR 290M For Minister of Transport



TRANSFER REQUEST

INSTRUCTIONS

A transfer of ownership requires a prior approval from the Minister.

The reissue of the certificate in the name of the transferee will be contingent upon a demonstration made by the new owner that he can fulfill the responsibilities of an approval holder. Refer to AMA 513/5 for further details.

REQUEST FOR TRANSFER OF OWNERSHIP – LIMIT	ED SUPPLEMENTAL TYPE CERTIFICAT	E or REPAIR DESIGN CERTIFICATE
FROM (NAME AND ADDRESS ÔF HOLDER)		
TO (NAME AND ADDRESS OF TRANSFEREE)		
	-	
TRANSFER PARTICULARS (LICENSE AGREEMENT, SALE OF RIGHTS, ETC.)		
SALE OF MOTTO, ETO.)	·	
	-	
DATE TRANSFER REQUIRED:		
	SIGNATURE	
	(OF ORIGINAL OWNER)	



(Continuation Sheet)

Number: C-LSH08-157/D Issue 1

NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE CERTIFICATE REFERRED TO THEREIN.

Transport Canada approved, AERO Design Ltd. Flight Manual Supplement FMS758.90, Revision 0, dated 07 April, 2008, and Transport Canada approved, AERO Design Ltd. Flight Manual Supplement FMS792.90, Revision 0, dated 07 April, 2008, or later approved revision is required with this installation

Data Pertinent to All Configurations:

Transport Canada accepted, AERO Design Ltd. Instructions for Continued Airworthiness ICA758.90, Revision 0, dated 30 April, 2008, or later accepted revision is required with this installation.

Basis of Certification for installation is FAR 29 at amendment 29-2.

End –

AERO DESIGN LTD.

2013 – 39 Avenue N.E., Calgary, Alberta, T2E 6R7

Tel: 403-250-8027 Fax: 403-250-8333 www.aerodesign.ca

28 April, 2008

Transport Canada Aircraft Certification Division 800-1601 Airport Road Calgary, Alberta T2E 6Z8

Attn:

Greg Oucharek

Your File: C-08-0363

Our File: 758

Re:

Extension of Deligation

Greg,

Please extend my delegation to include the following paragraphs listed on compliance program CP758.

29.865(a)

External Loads

29.865(e)

External Loads

Regards

E. Burgoih, P. Ing, DAR 290M

FORM AE-100

						T	
DEPARTMENT OF TRAN STATEMENT OF COMPLIANCE OF AIRCI COMPONENTS WITH THE AIRWORTHINI			CRAFT OR AIRCRAFT		AE-100 No.: Initial Issue Date: Revision:	AE75 29 Ap	8-1 ril, 2008
Aircraft Mfgr: Bell Aircraft Model: 212, 412, 205A-1,		Model Type		Revision Date: Approval No.:	C-LSH08-157/D		
Registration: 205B Registration: C-GALI, C-FAHR, C-FAHZ, C-FAHB, C-FAHL, C-FALV, C-GIRZ, C-FAHK, C-GAHV, C-FAHP, C-GAHO, C-FAHG, C-FALK, C-GRNR, C-FALK, C-GRNR,		Airplane Helicopter Appliance Component	e ter Delegation Note Delegate Nate		290M E. Burgoin AERO Design Ltd.		
		LI	ST OF APPROVE	D REPO	RTS AND DATA		
Document	Number			Docum	ent Title		Compliance
			Document Title				Status As per Compliance CP758-1 Rev 0 CP758-2 Rev 0
			DATA APPRO	OVED BY	TRANSPORT CANADA		
FMS758 Revision 0 Flight Manual Supplement Flight Manual Supplement							
			CERT	TIFICATIO)N		
DATA LISTED A WITH ESTABLIS	UNDER THE AUTHORITY VESTED IN ME BY THE DEPARTMENT OF TRANSPORT, I HEREBY CERTIFY THAT THE DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED NII HAVE BEEN EXAMINED IN ACCORDANCE WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY, TO THE BEST OF MY KNOWLEDGE AND BELIEF WITH THE PERTINENT COMPLIANCE REQUIRMENTS. I THEREFORE [X] RECOMMEND FOR APPROVAL OF THESE DATA						
[□] APPROVE THESE DATA E. Burgoin, DAR 290M							

AERO DESIGN LTD. 2013 – 39 Avenue N.E., Calgary, Alberta, T2E 6R7

Tel: 403-250-8027 Fax: 403-250-8333 www.aerodesign.ca

08 April, 2008

Transport Canada Aircraft Certification Division 800-1601 Airport Road Calgary, Alberta T2E 6Z8

Attn:

Greg Oucharek

Your File:

Our File: 758

Re:

Installation of Rappel Mount Provision and Cargo Deployment Provision

Greg,

Please find attached the following documents related to this project:

Modification Approval Request Application Form	MOD758	Revision 0
Compliance Program	CP758	Revision 0
Project Summary	PS758	Revision 0
Alpine Helicopters Ltd. Fleet Information		

Regards,

E. Burgoin, P.Eng, DAR 290M

Encl.

ALPINE HELICOPTERS LTD. FLEET INFORMATION

REGISTRATION	TYPE	S/N	DATE OF MANUFACTURE
C-GALI C-FAHZ C-FAHL C-GIRZ C-GAHV C-FAHR C-FAHB C-FAHV C-FAHV C-FAHV C-FAHV C-FAHV C-FAHV	BELL 212	30525 30562 30588 30622 30699 30789 30794 30816 30852 30933 30937 30940	1971 1973 1973 1974 1975 1976 1976 1977 1979
C-FALK C-GRNR	BELL 212 BELL 212	30982 30999	
C-FALK C-GRNR	BELL 212 BELL 212	30982 30999	1980 1980
C-FAHC	BELL 212	31246	1983

	MODIFICATION APPROV	AL RI	EQUEST AP	PLICE	ON F	ORM	MOD7	58, Rev. 0
1.	NAME AND ADDRESS OF APPLICANT:	2.	2. IDENTIFICATION OF PRODUCT					
	AERO Design Ltd. 2013 - 39 th AVE NE Colore AP 735 6D7		MODEL:					
	Calgary, AB T2E 6R7	l Be	ell			205A-1, 20	5B, Z1Z,	412
	ALL CORRESPONDANCE TO: AERO Design Ltd.	SER	IAL No.:		R	REGISTRATION	l:	
	2013 39th Ave N.E. Calgary, AB T2E 6R7		ee Attached - Al elicopters Ltd. F			See Attach Helicopters		
3.	REQUEST FOR:							
	A. SUPPLEMENTAL TYPE CERTIFICATE (STC)							
	B. STC/STA REVISION		STC/STA No.					
	C. LIMITED SUPPLEMENTAL TYPE CERTIFICATE (LSTC)	\boxtimes						
	D. LIMITED STC/STA REVISION		LSTC/LSTA No.					
	E. F.A.A. SUPPLEMENTAL TYPE CERTIFICATE							
	F. F.A.A. STC REVISION		STC No.					
	G. FAMILIARIZATION OF F.A.A. STC		STC No.					
	H. REPAIR DESIGN APPROVAL (RDC)							
	I. PARTS DESIGN APPROVAL (PDA)							
4.	TITLE OF MODIFICATION OR REPAIR: Installation of a rappel mount provision and cargo deployment pro	ovision.						
5.	BRIEF DESCRIPTION OF MODIFICATION OR REPAIR:							
	The installation provides an aircraft mount for rappelling and carg	o deploy	ment operations by	trained perso	onnel (ie	e. rappelling fire	fighters).	
6.	APPLICABLE TYPE APPROVAL (TA) OR TYPE CERTIFICATE	(TC) D	OCUMENTS:					
	A. TA NO. H-86 B. TC No. H1SW	(C. OTHER		_			
7.	PROPOSED BASIS OF APPROVAL: A. SAME AS TA □ B. SAME AS TC □	(C. OTHER	(Please sp	ecify)			
8.				REQUI	RED	FOR	DOT USE	ONLY
	DOCUMENTATION CHECKLIST						RECEIVED)
_	COMPLIANCE PROCESS			YES	NO	YES	NO	DATE
-	COMPLIANCE PROGRAM MASTER DRAWING LIST		,	X				
-	FLIGHT MANUAL SUPPLEMENT			$\frac{\lambda}{x}$				
	MAINTENANCE MANUAL SUPPLEMENT				X			MARKET AND SERVICE OF THE SERVICE OF
	INSTRUCTIONS FOR CONTINUING AIRWORTHINESS			×				
	ENGINEERING REPORTS			х				
	DESIGN DRAWINGS				Х			
	MANUFACTURE DRAWINGS & INSTALLATION INSTRUCTION	1 S		Х				
	ELECTRICAL LOAD ANALYSIS				Х			
	DRAFT STC, LSTC OR RDA				Х			
	WEIGHT AND MOMENT CHANGE			х				
	FLIGHT TEST DATA				X			
_	OTHER (Specify)				X	914,4075		
9.	9. APPLICANT'S REMARKS:							
10.	In addition to the payment of Aircraft Certification approval fees as prescrib incremental expenses as in Aviation Regulation Directive No. 3, or equival AERO Design Ltd.	bed in Car lent, as ap	nadian Aviation Regula oplicable. For further d	itions (CAR) Se etails governin	ection 10- g cost red	4, I agree to reim covery, refer to Al	burse Transp VIA 513/4.	oort Canada
	PER:	Cor	nsultant				08 April, 2	2008
	SIGNATURE OF APPLICANTS	TITLE					DATE	
11.								
	SIGNATURE OF REGIONAL ENGINEER						DATE	



Project Summary

PS758, Revision 0, 08 April, 2008

Rappelling Provisions Title:

Cargo Deployment Provisions

Approval:

LSTC

Manufacture:

Mfd by Aero Design (amend Approved Producuct List)

Customer:

Type and Model: Bell models 205A-1, 205B, 212, and 412

Definition Of Change:

Description:

Provincial Forestries use Bell medium helicopters for initial response to fires. At the fire location there may not be suitable landing areas that can accommodate the helicopter within a reasonable distance.

Fire fighting personnel disembark the helicopter while it hovers by rappelling down lines suspended from anchor points on the helicopter. They make use of rappelling harnesses, ropes and braking devices designed specifically for this type of application in other non-aviation environments and built to accepted international standards.

Their equipment is slung out of the passenger compartment and lowered to the ground in a controlled manner on lines attached to the cargo.

A load-master, a permanent crew member of the helicopter coordinates and controls both the disembarkiment of personnel and the deployment of their equipement and cargo.

Both the rappel lines and the cargo deployment lines are released from the helicopter as soon as equipment or personnel are safely on the ground.

Primary Changes to the Aeronautical Product:

Installation of attachment provisions from which equipment can be lowered to the ground capable of supporting the maximum cargo load at ultimate maneuvering load.

Installation of attachment provisions for attaching rappel lines capable of supporting maximum personnel loads including any equipment they may be carrying.

Secondary Changes to the Aeronautical Product (Required as consequence of primary changes):

None

Other Relevant Modifications to the Aeronautical Product (Which impact on this change):

Project Summary

PS758, Revision 0, 08 April, 2008

Substantial Change Evaluation:

The scope of this change is not substantial.

Significant Change Evaluation:

•	•	
	Refer to AMA 500/16, Appendix A, Tables A.2.1 through A.5.6, as applicable.	
	Yes No No The change is an example on the table of Significant Changes. Yes No The change is close to an example on the table of Significant Changes. Yes No The change is an example on the table of Not-Significant Changes. Yes No The change is close to an example on the table of Not-Significant Changes. Yes No The change is not an example on the tables.	Changes. Iges.
Α.	Is the general configuration changed? A change to the general configuration at the product level that is likely to require a new model designation because of the need to distinguish the different product with other product models (eg. performance, interchangeability of major components etc).	Yes ☐ No ⊠
B.	Are the principles of construction changed? A change at the product level to the materials and/or construction methods that affects the overall product's operating characteristics or inherent strength.	Yes ☐ No ⊠
C.	Have the assumptions used for certification been invalidated? Changes to product level assumptions, either design or engineering, associated with product development, compliance demonstration, performance or operating envelope that by themselves are so different, that the original assumptions are invalidated and the existing substantiation cannot be extrapolated to cover the changed product.	Yes □ No ⊠
Ва	sis of Certification of the Basic Aeronautical Product: Type Certificate Data Sheet: H1SW	
Ва	sis of Certification for the Change to the Aeronautical Product:	
	Same as the original basis of certification on the Type Certificate Data Sheet.	
list not	der the authority vested in me by the Minister, I have examined the change is ed above according to the established procedures and hereby determine the significant pursuant to subsection 511.13(3) or 513.07(3) of the CARS, to the context of the c	ine that it is
E.	Burgoin, P. Eng., DAR 290M	08 April, 2008 Date

AIRWORTHINESS REQUIREMENTS COMPLIANCE PROGRAM

CP758-01

APPLICANT: AERO Design Ltd.

2013 - 39th Ave N.E.

Calgary, Alberta

T2E 6R7

MAKE: Bell

REV. No. 0

CORRESPONDANCE TO: AERO Design Ltd.

MODEL: 205A-1, 205B, 212, and 412

DATE: 01 October 2007

(If other than applicant) 2013 - 39th Ave N.E.

Calgary, Alberta T2E 6R7

REGISTRATION: SERIAL No.:

NATURE OF WORK: Cargo deployment from hover - Forestry applications

MODEL CERTIFICATION BASIS: FAR 29, Amendment 2 and CAR 7 Amendment 4 for 205A-1 and 205B MODIFICATION CERTIFICATION BASIS: FAR 29, Amendment 2 and Amend 29-43 for 29.865(a) and 29.865(e)

Airworthines Requirement		Form of Substantiation	DOT	DAR	Comments
	Subpart B - Flight				
29.29	Empty weight and CofG	Installation weight and moment on drawings		X	
	Subpart C – Strength Requirements				
29.301 29.303 29.305 29.307(a)	Loads Factor of safety Strength and deformation Proof of structure	Analysis Analysis Analysis Analysis		X X X	
29.309(a)	Design limitations – design maximum weight	Limitation		Х	Design max weight for this piece of equipment only
29.309(d) 29.337(a) 29.341 29.351 29.561	Design limitations – maximum rearward and sideward flight speeds Limit maneuvering load factor Gust loads Yawing conditions Emergency Landing Conditions	Limitation Analysis N/A N/A N/A		X X	Speed limitations for deployment phase of flight only. Loads only applied in hover phase of flight Loads only applied in hover phase of flight
	Subpart D – Design and Construction				
29.601 29.603	Design Materials	Statement Design		X X	

AIRWORTHINESS REQUIREMENTS COMPLIANCE PROGRAM

Airworthiness Requirement	Subject for Compliance or Documentary Proof	Form of Substantiation	DOT	DAR	Comments		
29.605	Fabrication methods	Design		Х	No processes that require close control beir applied in the design.		
29.609	Protection of Structure	Specifications on drawings		X	applied in the design.		
29.611	Inspection provisions	Design		Χ			
29.613	Material strength properties and design values	Use of materials listed in Mil-Hdbk 5		X			
29.619	Special factors	Compliance with 29.623 and 29.625		X			
29.623	Bearing Factors	Analysis		Χ			
29.625	Fitting Factors	Analysis		Х			
29.785(a)	Seats, births, litters, safety belts, and harnesses.	Analysis		Χ			
29.785(e)	Seats, births, litters, safety belts, and harnesses.	Analysis		X			
29.865(a)	External Loads	Analysis		Х	Limitation: Rappel operations while helicopter in hover only.		
29.865(e)	External Loads	Flight Manual Supplement	Χ		in novel only.		
	Subpart F – Equipment						
29.1301	Function and installation	Design		X			
	Subpart G – Limitations						
29.1501	Operating limitations – General	Provision of Flight Manual Supplement (FMS) Placards	Х				
29.1503	Airspeed limitations	Limitation in FMS	Χ		Limitation to hover and low translational speeds during deployment phase		
29.1523	Minimum crew	Limitation in FMS	X		Load-master shall be on-board in addition to pilot		
29.1525	Kinds of operation	Limitation in FMS	X		Allows deployment Restricts rotorcraft occupants to crew member and others essential to the operation.		
29.1529	Instructions for Continued Airworthiness	ICA Provided	X		and others essential to the operation.		
29.1541	Markings and placards	Placards on drawings - weight limitation for deployment		X			
29.1581	Rotorcraft Flight Manual	Provision of FMS	X				
29.1583	FMS Operating Limitations	Provision of limitations in FMS	x				
		Provision of normal and emergency					
29.1585	FMS Operating Procedures	procedures in FMS	X				
		procedures in rivio					

CP758-02

APPLICANT: AERO Design Ltd.

2013 - 39th Ave N.E.

Calgary, Alberta

T2E 6R7

CORRESPONDANCE TO: AERO Design Ltd.

(If other than applicant) 2013 - 39th Ave N.E.

Calgary, Alberta T2E 6R7

MAKE: Bell

REV. No. 0

MODEL: 205A-1, 205B, 212, and 412

DATE: 01 October 2007

REGISTRATION: SERIAL No.:

NATURE OF WORK: Rappel Anchor Provision - Forestry applications

MODEL CERTIFICATION BASIS: FAR 29, Amendment 2 and CAR 7 Amendment 4 for 205A-1 and 205B MODIFICATION CERTIFICATION BASIS: FAR 29, Amendment 2 and Amend 29-43 for 29.865(a) and 29.865(e)

Airworthiness Requirement	Subject for Compliance or Documentary Proof	Form of Substantiation	DOT	DAR	Comments		
	Subpart B - Flight						
29.29	Empty weight and CofG	Installation weight and moment on drawings		X			
	Subpart C – Strength Requirements						
29.301	Loads	Analysis		Х	215 lb. 95 percentile person plus equipment load		
29.303 29.305 29.307(a)	Factor of safety Strength and deformation Proof of structure	Analysis Analysis Analysis		X X X			
29.309(a)	Design limitations – design maximum weight Limitation			Χ	Design max weight for this piece of equipme only		
29.309(d) 29.337(a) 29.341 29.351 29.561	Design limitations – maximum rearward and sideward flight speeds Limit maneuvering load factor Gust loads Yawing conditions Emergency Landing Conditions	Limitation Analysis N/A N/A N/A		X X	Speed limitations for rappelling phase of flight only. Loads only applied in hover phase of flight Loads only applied in hover phase of flight		
	Subpart D – Design and Construction						
29.601 29.603	Design Materials	Statement Design		X			

AIRWORTHINESS REQUIREMENTS COMPLIANCE PROGRAM

Airworthiness Requirement	Subject for Compliance or Documentary Proof	Form of Substantiation	DOT	DAR	Comments		
29.605	Fabrication methods	Design		Х	No processes that require close control beir applied in the design.		
29.609	Protection of Structure	Specifications on drawings		Χ	applied in the deergin		
29.611	Inspection provisions	Design		X			
29.613	Material strength properties and design values	Use of materials listed in Mil-Hdbk 5		X			
29.619	Special factors	Compliance with 29.623 and 29.625		X			
29.623	Bearing Factors	Analysis		X			
29.625	Fitting Factors	Analysis		X			
29.785(a)	Seats, births, litters, safety belts, and harnesses.	Analysis		X			
29.785(e)	Seats, births, litters, safety belts, and harnesses.	Analysis		X			
29.865(a)	External Loads	Analysis		X	Limitation: Rappel operations while helicopter in hover only.		
29.865(e)	External Loads	Flight Manual Supplement	Χ				
	Subpart F – Equipment						
29.1301	Function and installation	Design		X			
	Subpart G – Limitations						
29.1501	Operating limitations – General	Provision of Flight Manual Supplement (FMS) Placards	x				
29.1503	Airspeed limitations	Limitation in FMS	X		Limitation to hover during rappel phase		
29.1523	Minimum crew	Limitation in FMS	Χ		Load-master shall be on-board in addition to pilot Allows rappelling		
29.1525	Kinds of operation	Limitation in FMS	X		Restricts rotorcraft occupants to crew member and others essential to the operation.		
29.1529	Instructions for Continued Airworthiness	ICA Provided Placards on drawings	Χ		Cita Cita Cita Constituti de la Capacitation		
29.1541	Markings and placards	- weight limitation for rappelling anchor		X			
29.1581	Rotorcraft Flight Manual	Provision of FMS	Χ				
29.1583	FMS Operating Limitations	Provision of limitations in FMS	X				
29.1585	FMS Operating Procedures	Provision of normal and emergency	X				
29. 1000	Fivid Operating Frocedures	procedures in FMS	^				
29.1587	FMS Performance	N/A			No change from Type Approval		

	MC ICATION APPROV	AL R	EQUEST AF	PLICAT	FO	ORM	MOD	75B, Rev. 0	
1.	NAME AND ADDRESS OF APPLICANT;	2.	IDENTIFICATION	CT					
	AERO Design Ltd.	MAH	⟨€ :	MC	MODEL:				
	2013 - 39 th ĀVE NE, Calgary, AB T2E 6R 7		ell		205A-1, 205B, 212, 412				
	ALL CORRESPONDANCE TO: AERO Design Ltd. 2013 39th Ave N.E. Calgary, AB T2E 8R7		SERIAL No.: See Attached - Alpine Helicopters Ltd. Fleet Info			REGISTRATION:			
						See Attached - Alpine Helicopters Ltd. Fleet Info			
3,	REQUEST FOR:			***************************************				1	
	A. SUPPLEMENTAL TYPE CERTIFICATE (STC)								
	B. STC/STA REVISION		STC/STA No.						
	C. LIMITED SUPPLEMENTAL TYPE CERTIFICATE (LSTC)	\boxtimes							
	D. LIMITED STC/STA REVISION		LSTC/LSTA No).					
	E. F.A.A. SUPPLEMENTAL TYPE CERTIFICATE								
	F. F.A.A. STC REVISION		STC No.						
	G. FAMILIARIZATION OF F.A.A., STC								
		_	STC No.						
		Ļ							
L	I. PARTS DESIGN APPROVAL (PDA)								
4.	TITLE OF MODIFICATION OR REPAIR: Inetaliation of a rappel mount provision and cargo deployment pro-	tvision.					•		
5.	BRIEF DESCRIPTION OF MODIFICATION OR REPAIR:		SSEC AND CHARGE SACRATION OF SOCIAL PROPERTY.				•	-	
	The installation provides an aircraft mount for rappelling and cargo	o deploy	meni operations b	y trained per	sonnel (le.	rappelling fir	e fighters).		
ß.	APPLICABLE TYPE APPROVAL (TA) OR TYPE CERTIFICATE	(TC) D	DCUMENTS:						
L	A. TA NO. H-86 B, TC No. H1SW	(C. OTHER		-				
7.	PROPOSED BASIS OF APPROVAL:			- Anna Carlotte	· ****	***************************************			
	A. SAME AS TA 🗵 B. SAME AS TC 🗀	(C. OTHER	(P16866 s	pecify)				
8.	8. REQU				IRED	FOR DOT USE ONLY			
	DOCUMENTATION CHECKLIST					RECEIVED			
-	COMPLIANCE PROGRAM		drin	YE9	NŌ	YES	NO	DATE	
	MASTER DRAWING LIST			X	-	┼	-		
	FLIGHT MANUAL SUPPLEMENT			x					
	MAINTENANCE MANUAL SUPPLEMENT				X	 		-	
	INSTRUCTIONS FOR CONTINUING AIRWORTHINESS		X		1.				
	ENGINEERING REPORTS			X		-			
	DESIGN DRAWINGS		***************************************		X				
L.	MANUFACTURE DRAWINGS & INSTALLATION INSTRUCTIONS	S		x					
L	ELECTRICAL LOAD ANALYSIS				х				
	DRAFT STC, LSTC OR RDA				Х			-	
	WEIGHT AND MOMENT CHANGE			Х					
_	FLIGHT TEST DATA		Commence of the Commence of th		Х				
θ.	OTHER (Specify) APPLICANT'S REMARKS:				X	L			
	AFFINANTI S REMARING.								
19,	In addition to the second of the				-				
19,	In addition to the payment of Aircraft Certification approval fees as prescrib- incremantal exponents as in Aviation Regulation Directive No. 3, or equivale	ed in Con lift, fix app	iadian Aviadon Regula plicable, For further d	ellona (CAR) S Natale governin	gotion 104, i g cost recov	agree to reim very, refer to A	bursa Transp MA 513/4.	ort Canada	
	AERO Design Ltd.								
	PER:	-	sullant				08 April, Z	800	
11.	SIGNATURE OF APPLICANTS	TITLE		· · · · · · · · · · · · · · · · · · ·			pate	V Malanasa was	
						700	9-04-	79	
1	SIGNATURE OF REGIONAL ENGINEER						DATE	-	
1	FarryMOD, 25 Merch, 2001				-				



1100-9700 Jasper Avenue Edmonton, Alberta T5J 4E6 Your file Votre reference

Our file Notre reference

C-08-0363 5010-0402

May 5, 2008

AERO Design Limited 2013 39 Ave. NE Calgary, AB T2E 6R7

SUBJECT: Extension of DAR 290M Authority – Bell 212, 412 and 205 series rotorcraft, Installation of Rappel and Cargo Deployment Provisions, C-LSH08-157/D

This is in response to your April 28, 2008 request for extension of delegation to cover the subject design change. You are hereby authorized to make findings of compliance for the following Airworthiness Standard as listed in Compliance Plan CP758:

29.865(a) and (e) External Loads

This is a one-time extension, granted in accordance with Airworthiness Manual, Chapter 505.223(a) and is limited to be exercised for this approval only. Approval number C-LSH08-157/D has been assigned for your use.

If you have any questions or wish to discuss this project further, please contact the project OPI, Greg Oucharek at the Calgary TCC.

Yours truly

F.J.B. Wright

Regional Manager Aircraft Certification

Prairie and Northern Region Phone: (780) 495-3856

Fax: (780) 495-7963